Solicitation Document

REQUEST FOR PROPOSALS

03-013-PR

for

Supply and Delivery of

Power Generation Equipment

for the

King County West Point Wastewater Treatment Facility

Contract 238421

King County

Business Operations Division
Procurement and Contract Services Section
Department of Executive Services
Exchange Building, 8th Floor, EXC-FI-0862
821 Second Avenue
Seattle, WA 98104-1598
Paul C. Russell C.P.M. CPPB
Grants and Contract Specialist III

CONTRACT AGREEMENT

(Sample)

THIS CONTRACT, made this _____day of _____, 2003, by and between King County, Washington, (hereinafter "County") and _____ (hereinafter "Supply Contractor").

WITNESSETH:

WHEREAS, the County has caused Contract documents for:

Contract No.: **238421**
Contract Title: **Power Generation Equipment for the King County West Point Wastewater Treatment Facility**

to be prepared for certain Work as described therein; and

WHEREAS, the Supply Contractor has assured the County that it has the specialized expertise and experience necessary to properly perform the Work, which includes provision of the Goods and performance of the Services in a timely manner and that its Proposal includes all of the functions and features required for the Work; and

WHEREAS, the County has accepted the Supply Contractor's offer to perform the Work in accordance with the Contract's terms, Specifications and Proposal documents;

WHEREAS, by executing this Contract, the Supply Contractor represents that the waiver of the Supply Contractor's immunity under industrial insurance, Title 51 RCW, as set forth in the Contract documents was mutually negotiated by the parties;

NOW THEREFORE, in consideration of the mutual covenants and agreements of the parties herein contained and to be performed, the Supply Contractor hereby agrees to supply the Goods and Services at the price and on the terms and conditions herein contained, and to assume and perform all of the covenants and conditions herein required of the Supply Contractor, and the County agrees to pay the Supply Contractor the Contract price Provided herein for the supply of the Goods and Services and the performance of the covenants set forth herein.

THE FURTHER TERMS, CONDITIONS AND COVENANTS of the Contract are set forth in the following exhibit parts each of which is attached hereto and by this reference made a part hereof in the following order of precedence: **[1]** Change Orders; **[2]** the Contract Document which includes: Terms and Conditions, Technical Specifications; Attachments: A) Proposal Response Form, C) Performance and Payment Bond, D) Personnel Inventory Report, E) Affidavit and Certificate of Compliance, G) Current or Former King County Employee Disclosure Form, and, **[3]** RFP Addenda; **[4]** Request for Proposal; **[5]** Best and Final Offer (if submitted); and, **[6]** the Proposal submitted.

SUPPLY CONTRACTOR **KING COUNTY**

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Attachment A	Proposal Response Form	
Attachment B		not used
Attachment C	Performance and Payment Bond	
Attachment D	Personnel Inventory Report	
Attachment E	Affidavit and Certificate of Compliance	
Attachment F		not used
Attachment G	Current or Former King County Employee Disclosure Form	

NOTE:
Electronic versions of required attachments and forms are available. Contact the buyer, Paul Russell, at paul.russell@metrokc.gov.

DEFINITION OF WORDS AND TERMS

Words and terms shall be given their ordinary and usual meanings. Where used in the Contract Documents, the following words and terms shall have the meanings indicated. Initial capitalization of a word or term indicates that it is defined herein or used as a subsection or column heading or elsewhere defined in the RFP. The meanings shall be applicable to the singular, plural, masculine, feminine and neuter of the words and terms.

Act of Nature: A cataclysmic phenomenon of nature, such as an earthquake, flood or cyclone.

Addenda: Written additions, deletions, clarification, interpretations, modifications or corrections to the Contract Documents issued by the County during the Proposal period and prior to the date and time established for submittal of Proposals.

Best and Final Offer: Best and Final Offer shall consist of the Proposer's revised Proposal and the supplemental information provided during the evaluation. In the event of any conflict or inconsistency in the items submitted by the Proposer, the items submitted last will govern.

Buyer: Individual designated by King County to conduct the Contract solicitation process, draft and negotiate contracts, resolve contractual issues and support the Project Manager during Contract performance.

Change Order: Written order issued by the County, with or without notice to sureties, making changes that modify the scope of Work or other terms to the Contract as set forth in the Contract documents.

Contract or Contract Documents: The writings and drawings embodying the legally binding obligations between the County and the Supply Contractor for completion of the Work under the Contract as listed on Page 2 of this Document.

Contract Price: Amount payable to the Supply Contractor under the terms and conditions of the Contract for the satisfactory performance.

Contract Period: The period of time during which the Supply Contractor shall perform the Work under the Contract.

Contract Time: Number of calendar Days and/or the intermediate and final completion dates stated in the Contract Documents for the completion of the Work specified herein.

Cost Analysis: The review and evaluation of the separate cost elements and proposed profit of Supply Contractor’s cost or pricing data. Cost analysis is the application of judgment utilizing criteria to project from the data to the estimated costs in order to form an opinion on the degree to which the proposed costs represent what the Contract should cost, assuming reasonable economy and efficiency.

Criteria, Evaluation Criteria or Evaluation Factors: The elements cited in the RFP that the County will examine to determine the Proposer’s understanding of the requirements; technical, business and management approach; key Personnel; qualification and experience

of the Proposer; potential for successfully accomplishing the Contract; risk allocation and the probable cost to the County.

Day: Calendar Day.

Documentation: Technical publications relating to the Work to be Provided by Supply Contractor under this Contract, such as reference, user, installation, system administration, and technical guides, delivered by the Supply Contractor to King County.

Executive: King County Executive

Final Acceptance: The point when King County acknowledges that the Supply Contractor's Work is complete according with the Contract. King County shall give Final Acceptance of Work following the Supply Contractor's completion of all Work in accordance with the Contract including the commissioning period of six months of continuous successful and trouble-free operation as defined in the Contract.

Goods: Power Generation Equipment including all necessary subsystems and Spare Parts.

Installation Contract: A separate contract between King County and a general contractor that will install the Power Generation Equipment

Installation Contractor: The general contractor that will install the Power Generation Equipment in the County Wastewater Treatment facility (*See* Section 1-1 Introduction E)

Person: Includes individuals, associations, firms, companies, corporations, partnerships, and joint ventures.

Price Analysis: The process of examining and evaluating a proposed price without evaluating its separate cost elements and proposed profit.

Project Manager: The individual designated by the County to manage the project on a daily basis and who represents the County for Contract administration, and is the Contractors primary point of contact. The Project Manager, or his delegated Project Representative, will document the Supply Contractor's performance and approve orders, receipts, and invoices.

Project Representative: The individual designated by the County Project Manager to administrator the project on a daily basis and who represents the County for Contract administration. The Project Representative, by authority of Project Manager, will document the Supply Contractor's performance and approve orders, receipts, and invoices.

Proposal Evaluation Team (PET): Team of people appointed by the County to evaluate the Proposals, conduct discussions, call for Best and Final Offers, score the Proposals and make recommendations.

Proposed Work Change (PWC): A written document issued by the Project Manager, or his/her designee, to the Proposer identifying contemplated changes in the Work and requesting a price estimate from the Supply Contractor; such a document shall not be interpreted or construed to constitute a Change Order.

Proposer: Individual, association, partnership, firm, company, corporation or a combination thereof, including joint ventures, submitting a Proposal to perform the Work.

Proposer's Representative: The individual designated in writing by the Proposer to act on its behalf under this Contract.

Provide: Furnish without additional compensation.

RCW: The Revised Code of Washington.

RFP: Request for Proposals. Also known as the solicitation document.

Reference Documents: Reports, Specification, and drawings which are available to Proposers for information and reference in preparing Proposals but are not part of this Contract.

Services: The furnishing of labor, time or effort by a Supply Contractor, not involving the delivery of any specific end product. Work performed to meet a demand, especially Work not connected with a manufacturing process.

Specifications or Technical Specifications: A Section of the Contract Documents consisting of written descriptions of Goods to be provided and Services to be performed or of the tech-nical requirements to be fulfilled under this Contract.

Subcontractor: The individual, association, partnership, firm, company, corporation, or joint venture entering into an agreement with the Supply Contractor to perform any portion of the Work covered by this Contract.

Submittals: Information, which is submitted to the Project Manager in accordance with the Technical Specifications of the RFP.

Subsection: For reference or citation purposes, Subsection shall refer to the paragraph, or paragraphs, called out by part, section and alphanumeric designator

Supply Contractor: The individual, association, partnership, firm, company, corporation, or combination thereof, including joint ventures, contracting with the County for the performance of Work under the Contract.

Supply Contractor's Representative: The individual designated in writing by the Supply Contractor to act on its behalf under this Contract.

Work: Everything to be done and Provided for the fulfillment of the Contract, which includes everything defined under Goods and Services.

KING COUNTY

REQUEST FOR PROPOSALS AD PAGE

RFP NO. 03-013-PR

Proposal Submittal Date: July 15, 2003

Proposals for **Power Generation Equipment** for the **King County Wastewater Treatment Facility** will be received by King County, at its Procurement and Contract Services Section, Exchange Building, Mailstop EXC-FI-0871, Eighth Floor, 821 Second Avenue, Seattle, Washington 98104-1598 until 2:00 p.m. Seattle time on Proposal Submittal Date.

This RFP is for Supply and Delivery of Power Generation Equipment to be delivered to King County as specified. The Work includes, but is not limited to, the design, fabrication, testing, and delivery of engine-generator systems for a cogeneration/standby power system capable of using blended digester gas and natural gas as fuel at the West Point Treatment Plant. In addition to the provision of equipment, this Contract includes field services for assistance during installation, startup, commissioning, and training. Initially, two (2) '2 to 3 MW' engine-generators will be supplied, with an option for the County to purchase a third engine-generator and/or spare parts.

This RFP is available on the Internet at http://www.metrokc.gov/finance/procurement and by choosing the "**RFPs, RFQs, ITBs**" menu tab, then click the "**New**" menu tab, then click on "**Goods & Services**", and look for RFP 03-013-PR. Persons who copy the Document from the Internet must inform Paul Russell that they have received the document. If they fail to inform Mr. Russell they will not be notified of Addenda as issued. All Addenda must be referenced in the Proposal Response Form.

A non-mandatory pre-proposal conference will be held at 10:00 a.m. PST on June 17, 2003 at King County West Point Wastewater Treatment Facility 1400 Utah St. West, Seattle, WA 98119 in the Administration Building Rainer room. The intent of the pre-proposal conference is to assist the Proposer in fully understanding the requirements under this RFP.

Information may be obtained by contacting the undersigned by E-mail at paul.russell@metrokc.gov , phone number (206) 684-1054, FAX number (206) 684-1470, or in Person at the above address.

The County reserves the right to reject any and all Proposals submitted or parts thereof, and to waive informalities or minor irregularities.

This information is available on request in accessible formats for people with disabilities by calling (206) 684-2046 or 711 (TTY Relay).

King County

Paul Russell C.P.M. CPPB
Grants and Contracts Specialist III
Phone No.: (206) 684-1054
Fax No.: (206) 684-1470
E-mail paul.Russell@metrokc.gov

Date of Publication: May 29, 2003

SECTION 1 - PROPOSAL PREPARATION

1-1 Introduction

A. Description of Work:

This Contract calls for the Supply and Delivery of Power Generation Equipment to King County West Point Wastewater Treatment Facility as specified herein. The Work includes, but is not limited to, the design, fabrication, testing, delivery of engine-generator systems for a cogeneration/standby power system capable of using blended digester gas and natural gas as fuel at the West Point Treatment Plant In addition to the provision of equipment, this Contract includes field services for assistance during installation, startup, training, and commissioning. Initially, two (2) '2 to 3 MW' engine-generators will be supplied, with an option for the County to purchase a third unit.

B. Engine-Generator Systems:

Engine-generator systems will include the engine-generators, heat recovery silencers, supplemental silencers, waste heat radiators, starting air systems, engine control panels, generator control panels, switchgear, circuit breakers, and electrical monitoring and protection equipment. The systems will be factory tested and shall meet performance criteria set forth in this RFP. The systems shall be complete and ready for setting in place and hookup under a separate Installation Contract. The successful Proposer shall oversee installation and check installation before startup. The successful Proposer shall then conduct startup and training. The successful Proposer shall participate in the prescribed commissioning process and provide warranty assistance as required.

C. Performance Levels:

These systems must meet the performance levels agreed upon during the RFP process. Air emissions, noise, fuel efficiency, and reliable operation on varying fuel mixtures are important criteria for this installation.

D. Installation:

Installation is not included in this Contract. Installation will be performed by others under a separate contract with King County. The Contract Document for the Installation Contractor will incorporate the Terms and Conditions and Technical Specifications of the King County – Power Generation Equipment Contract by reference and as an attachment.

E. Estimated Value of Contract:

For the initial Equipment Contract for purchase of two (2) power generator engines and the necessary spare parts the County has estimated an expenditure of between $4 and $6 million.

F. OPTION: Third Engine-Generator:

The Contract includes an option to purchase a third engine-generator in the '2 to 3 MW' size, to be supplied and delivered under the same terms and conditions, within six (6) years following the execution of the Contract. (*Include your pricing* in Section 6-8.14)

G. Separate Contract for Spare Parts:

The County may desire spare parts in the future. The potential parts and support will be addressed in a separate Contract, which may include the Contractors pricing for spare parts. The Parts Contract will provide a pricing structure and/or discount off the Supply Contractor/Manufacturer's published list price. The Spare Parts Contract is expected to have a one year term with the provision for nine (9) one year extensions to maximum period of ten (10) years. King County makes neither guarantees nor commitments, that the Supply Contractor will receive this Spare Parts Contract. (*Include your pricing* in Section 6-8.14)

1-2 Proposal Submission

Proposals shall contain all required attachments and information, be sealed and submitted to King County (hereinafter "County"), Procurement and Contract Services Section, Mailstop EXC-FI-0871, Eighth Floor, Exchange Building, 821 Second Avenue, Seattle, Washington 98104-1598 no later than 2:00 p.m. Pacific Standard Time on July 15, 2003.

The County reserves the right to request oral interviews, additional information, site visits, or any other type of clarification of Proposal information it deems necessary to evaluate Proposals.

1-3 Proposal Signature

Each Proposal shall be signed by the Proposer or the Proposer's authorized representative and include the Proposer's address. If the Proposal is made by an individual, the name, signature and post office address must be shown; if made by a partnership or joint venture, the name and post office address of the partnership or joint venture and the signature of at least one of the general partners or authorized joint venture partners must be shown; if made by a corporation, the name of the state under the laws of which the corporation is chartered, the name and post office address of the corporation and the title of the Person who signs on behalf of the corporation must be shown. The Proposal is signed in Attachment A.

1-4 Addenda

When, either before or after receipt of Proposals, the County changes, revises, increases, or otherwise modifies its requirements, the County shall issue a written addendum to the RFP. The Proposal Response Form, Attachment A, shall include acknowledgment of receipt and review of **ALL Addenda** issued during the Proposal period

In considering which firms to notify of a change, the County will consider the stage in the procurement process at which the change occurs and the magnitude of the change, as follows:

A. If Proposals are not yet due, the addendum will be sent to all firms that have received the RFP.

B. If the time for receipt of Proposals has passed but Proposals have not been evaluated, the addendum will be sent only to Proposers responding to the RFP.

C. If the Proposals have been evaluated and classified, only those Proposals classified as in the competitive range.

D. If a change is so substantial that it warrants substantial revision of the RFP, the County may cancel the original RFP and issue a new one, regardless of the state of the procurement process. The new solicitation will be issued to all firms originally solicited and to any firms added to the original list.

1-5 Schedule

Day/Month/Year	Event	
May 28, 2003	Public announcement of Request for Proposals	Advertisement
June 10, 2003	Pre-proposal questions due, in writing	Section 1-7
June 17, 2003	Pre-proposal conference	Section 1-7
June 23, 2003	Letter of Intent	Section 1-8
July 02, 2003	Last questions due, in writing,	Section 1-9
July 15, 2003	Proposals due	Section 1-2
July 17, 2003	Evaluation/Negotiation of Proposals begins.	Section 2

During evaluations/negotiations Proposers with Proposals judged unacceptable will be notified that they will not be considered further.

*August 15, 2003 Evaluation/Negotiation complete
*September 1, 2003 Execute Contract and issue Notice to Proceed

*NOTE Dates preceded by an asterisk are estimated dates. Estimated dates are for information only.

1-6 Inquiries

Inquiries concerning the procurement process shall be directed to Paul Russell at e-mail address: paul.russell@metrokc.gov or at phone number (206) 684-1054 or FAX number (206) 684-1470 or in writing to the County's Procurement and Contract Services Section, Eighth floor, Exchange Building, Mailstop EXC-FI-0871, 821 Second Avenue, Seattle, Washington 98104-1598.

Communications concerning this procurement, with other than the listed County staff may cause the firm to be subject to disqualification by the Manager of Procurement and Contract Services Section or designee.

1-7 Pre-proposal Conference

A non-mandatory pre-proposal conference will be held at 10:00 a.m. PST on June 17, 2003 at West Point Wastewater Treatment Facility at 1400 Utah St. West, Seattle, WA 98119 in the Administration Building Rainer room. The intent of the pre-proposal conference is to assist the Proposer in fully understanding the requirements under this RFP. Questions to be addressed at the Pre-proposal are due by close of business June 10, 2003.

1-8 Letter of Intent

A Letter of Intent is due by June 24, 2003 at County's Procurement and Contract Services Section, Eighth floor, Exchange Building, Mailstop EXC-FI-0871, 821 Second Avenue, Seattle, Washington 98104-1598 or by e-mail to paul.russell@metrokc.gov .

Prospective Proposers are strongly encouraged to submit a Letter of Intent. The Letter of Intent does not bind the prospective Proposer to submit a proposal, nor does failure to submit a Letter of Intent preclude any prospective proposer from submitting a proposal.

1-9 Interpretation of Proposal and Contract Documents

No oral interpretations as to the meaning of the RFP will be made to any Proposer. Requests for a written interpretation shall be made in writing and delivered or faxed to the Buyer at the County's Procurement and Contract Services Section at the address indicated in Section 1-6 at least ten (10) calendar Days before the date established for submitting Proposals. Any interpretation deemed necessary by the County will be in the form of an addendum to the RFP and when issued will be delivered as promptly as is practicable to all parties to whom the RFP has been issued. All Addenda shall become part of the RFP and any subsequently awarded Contract. Proposers shall not rely upon any oral statements or conversations, whether at the pre-proposal conference, if any, or otherwise, they may have with County employees or third parties regarding the RFP.

1-10 Examination of Proposal and Contract Documents

The submission of a Proposal shall constitute an acknowledgment upon which the County may rely that the Proposer has thoroughly examined and is familiar with the RFP, including any Work site identified in the RFP, and has reviewed and inspected all applicable statutes, regulations, ordinances and resolutions addressing or relating to the Goods and Services to be Provided hereunder. The failure or neglect of a Proposer to receive or examine such documents, Work sites, statutes, regulations, ordinances or resolutions shall in no way relieve the Proposer from any obligations with respect to it's Proposal or to any Contract awarded pursuant to this RFP. No claim for additional compensation will be allowed which is based upon a lack of knowledge or misunderstanding of this RFP, Work sites, statutes, regulations, ordinances or resolutions.

1-11 Cost of Proposals

The County is not liable for any costs incurred by Proposers in the preparation, presentation, testing or negotiation of proposals submitted in response to this RFP.

1-12 Modification or Withdrawal of Proposals Prior to Proposal Due Date

At any time before the time and date set for submittal of Proposals, a Proposer may request to withdraw or modify its Proposal. Such a request must be made in writing by a Person with authority as identified in Attachment A, Proposal Response Form. All Proposal modifications shall be made in writing, executed and submitted in the same form and manner as the original Proposal.

1-13 Errors and Administrative Corrections

A. The County will not be responsible for any Errors in Proposals. Proposers will only be allowed to alter Proposals after the submittal deadline in response to requests for clarifications or Best and Final Offers by the County. The County reserves the right to request an extension of the Proposal period from a Proposer or Proposers.

B. The County reserves the right to allow corrections or amendments to be made that are due to minor administrative Errors or irregularities, such as Errors in typing, transposition or similar administrative Errors.

1-14 Prompt Payment Discount

Proposals offering a prompt-payment discount for payments made within twenty (20) calendar Days will be evaluated at the discounted price.

1-15 Postponement or Cancellation of Request for Proposal

The County reserves the right to cancel the RFP or change the date and time for submitting Proposals.

1-16 Compliance with RFP Terms and Attachments

A. King County intends to award a Contract based on the terms, conditions and attachments contained in this RFP. Proposers are strongly advised to not take any exceptions. Pro-posers shall submit Proposals, which respond to the requirements of the RFP. An exception is not a response to a Proposal requirement. If an exception is taken, a “Notice of Exception” must be submitted with the Proposal. The “Notice of Exception” must identify the specific point or points of exception and Provide an alternative.

B. Proposers are cautioned that exceptions to the terms, conditions and attachments may result in rejection of the Proposal.

C. The County may, at its sole discretion, determine that a Proposal with a Notice of Exception merits evaluation. A Proposal with a Notice of Exception not immediately rejected may be evaluated, but its competitive scoring will be reduced to reflect the importance of the exception. Evaluation and negotiation will only continue with the Proposer if the County determines that a Contract in the best interest of the County may be achieved.

1-17 Proposal Requirements

A. The Proposal shall contain the following items and follow the exact sequence outlined below:

1. Table of Proposal Contents
2. Response to Responsibility items listed in Section 2-3.
3. Response to Proposal Questions requested in Sections 6-2 through 6-8.
4. Attachments:

   A Proposal Response Form.

   D Personnel Inventory Report.

   E Affidavit and Certificate of Compliance

   G Current or Former King County Employee Disclosure Form.
   (If applicable, complete and submit as part of the Proposal.)

5. Brochures, booklets or other sales material may be attached to the proposals (optional).

B. Submit six (6) copies of the Proposal and attachments. One (1) Original [marked ORIGINAL] shall be unbound to facilitate reproduction.

1-18 Collusion

If the County determines that collusion has occurred among Proposers, none of the Proposals of the participants in such collusion will be considered. The County's determina-tion shall be final.

1-19 Rejection of Proposals

A. The County reserves the right to reject any Proposal for any reason including, but not limited to, the following: any Proposal which is incomplete, obscure, irregular or lacking necessary detail and specificity; any Proposal which has any qualification, addition, limitation or provision attached to the Proposal; any Proposal from Proposers who (in the sole judgment of the County) lack the qualifications or responsibility necessary to perform the Work; any Proposal which is not approved as being compliant with the requirements for equal employment opportunity; any Proposal for which a Proposer fails or neglects to complete and submit any qualifications information within the time specified by the County; and any Proposal submitted by a Proposer which is not registered or licensed as may be required by the laws of the state of Washington or local government agencies.

B. In consideration for the County's review and evaluation of its Proposal, the Proposer waives and releases any claims against the County arising from any rejection of any or all Proposals, including any claim for costs incurred by Proposers in the preparation and presentation of Proposals submitted in response to this RFP.

1-20 Proposal Price and Effective Date

A. The Proposal price shall include everything necessary for the prosecution and completion of the Contract including but not limited to furnishing all materials, equipment, supplies, tools, plant and other facilities and all management, supervision, labor and service, except as may be provided otherwise in this RFP. Prices quoted in Section 6-8 shall include all freight charges, FOB to the designated delivery point. Washington State sales/use taxes and Federal excise taxes shall not be included in the Proposal price. The County will pay any Washington State sales/use taxes applicable to the Contract price or tender an appropriate amount to the Supply Contractor for payment to Washington State. The County is exempt from Federal excise taxes. All other government taxes, duties, fees, royalties, assessments and charges shall be included in the Proposal price.

B. The Proposal shall remain in effect for **200** calendar Days after final Proposal submittal date and time. In the event of a discrepancy between the unit price and the extended amount for a Proposal item, the County reserves the right to clarify the Proposal.

1-21 Procedure When Only One Proposal Is Received

If the County receives a single responsive, responsible and advantageous Proposal, the County shall have the right, in its sole discretion, to extend the Proposal Acceptance period for an additional sixty (60) Days and to conduct a price or cost analysis on such Proposal. The Proposer shall promptly Provide all cost or pricing data, Documentation and explanation requested by the County to assist in such analysis. By conducting such analysis, the County shall not be obligated to accept the single Proposal; the County reserves the right to reject such Proposal or any portion thereof.

1-22 Protest Procedures

A. Form of Protest: In order to be considered, a Protest shall be in writing, addressed to the Manager of the King County Procurement and Contract Services Section of the Business Operations Division, and include:

1. The name, address, and phone number of the Proposer protesting, or the authorized representative of the Bidder or Proposer;

2. The Request for Proposals ("RFP") Number and Title under which the Protest is submitted;

3. A detailed description of the specific grounds for protest and any supporting Documentation. It is the responsibility of the Protesting Proposer to supplement its Protest with any subsequently discovered documents prior to the Manager's decision;

4. The specific ruling or relief requested; and

5. Evidence that all Persons with a financial interest in the procurement have been given notice of the Protest or if such Persons are unknown, a state-ment to that effect.

B. Who May Protest.

1. Protests based on Specifications. Any prospective Proposer.

2. Protests following Proposal submittal. Any Proposer submitting a response to a RFP showing a substantial financial interest in the solicitation or award of any Contract.

C. Time to Protest. Protests based on Specifications or other terms in the RFP document which are apparent on the face of said document must be received by the County no later than ten calendar Days prior to the date established for submittal of Proposals. The County must receive protests based on other circumstances within five calendar Days after the protesting Proposer knows or should have known of the facts and circumstances upon which the Protest is based. In no event shall a Protest be considered if all bids are rejected or after award of the Contract.

D. Determination of Protest. Upon receipt of a timely written Protest, the Procurement and Contract Services Section Manager shall investigate the Protest and shall respond in writing to the Protest prior to the award of Contract. Except as Provided below, the decision of the Procurement and Contract Services Section Manager shall be final.

E. Reconsideration of Manager's Decision. A financially interested Supply Contractor may request that a Manager's adverse decision be reviewed by the Director of the King County Business Operations Division ("Director") on a reconsideration basis only. The only justifications for reconsideration are (1) new data, relevant to the underlying grounds for protest and unavailable at the time of the Protest to the Manager; or (2) the Manager made an Error of law or regulation. The following procedures shall be followed for a reconsideration of the Manager's decision:

1. Form of Request for Reconsideration. In order to be considered, a Request for Reconsideration must be filed with the Director in writing and include:

   i. Name, address, and telephone number of the Person protesting or their authorized representative;

   ii. A copy of the written decision of the Manager; and

   iii. Justification for a reconsideration by the Director, including all pertinent facts and law on which the Bidder or Proposer is relying.

2. Time for filing Request for Reconsideration. The financially interested Proposer must file the Request for Reconsideration no later than five calendar Days of receiving the Procurement and Contract Services Section Manager's decision.

3. Review of Manager's Decision. Upon receipt of a Request for Reconsideration, the Director or his/her designee shall review (1) the information submitted to and reviewed by the Manager and (2) the decision of the Manager, and shall thereafter issue a final determination regarding the Request for Reconsideration. No other information will be reviewed unless the basis for the request for reconsideration is new data.

F. Failure To Comply: Failure to comply with the procedures set forth herein may render a Protest untimely or inadequate and may result in rejection thereof by the County.

1-23 Proposal Alternatives

Proposals shall address all requirements identified in this RFP. In addition, the County may consider Proposal Alternatives submitted by Proposers that Provide Enhancements beyond the RFP requirements. Proposal Alternatives may be considered if deemed to be in the County's best interests. Proposal Alternatives must be clearly identified.

1-24 Supported Employment Program

King County encourages the creation of supported employment programs for developmentally and/or severely disabled individuals. The County itself has such a program and is actively seeking to do business with those Contractors and Consultants which share this employment approach. If your firm has such a program, or intends to develop such a program during the life of this Contract, please submit Documentation supporting this claim with your proposal. If you have questions, or need additional information, please contact the King County ADA Coordinator, (206) 296-7706 or the Office of Business Relations and Economic Development Compliance Supervisor, (206) 689-4593.

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SECTION 2 - PROPOSAL EVALUATION & CONTRACT AWARD

2-1 General

Proposals will be evaluated and ranked by the Proposal Evaluation Team (PET) on the basis of the criteria established in this RFP. The PET will evaluate the Proposals submitted in response to the RFP, conduct fact finding, discussions/negotiations, request Best and Final Offers and determine which Proposal is the most advantageous to the County for Contract award. The PET's recommendation is subject to review and approval.

2-2 Proposal Evaluation

A. The PET will evaluate each Proposal using the criteria set forth in this RFP. If deemed necessary by the PET, written and/or oral discussions may be conducted with those Proposers whose Proposals are found to be potentially acceptable. Identified deficiencies, technical requirements, terms and conditions of the RFP, costs or prices, and suspected mistakes may be included among the items for discussion. The discussions are intended to give Proposers a reasonable opportunity to resolve deficiencies, uncertainties and suspected mistakes as requested by the PET and to make the cost, pricing or technical revisions required by the resulting changes.

B. King County reserves the right to request other business and administrative information necessary to the conduct of this procurement.

C. The PET may find that the Proposer appears fully qualified to perform the Contract or it may require additional information or actions from the Proposer. In the event the PET determines that there are problems of such a nature or magnitude that it is advantageous to the County, the PET will eliminate the Proposal from further consideration. A Proposer bypassed for further evaluation or award by the PET for whatever reason shall have no claim for costs incurred including, but not limited to, presentation costs, Proposal preparation, the cost of providing additional information requested, or modification made either to its Proposal or internal structure or systems of the Proposer or its organization.

D. Upon completion of discussions, the PET may issue to all remaining potentially acceptable Proposers a request for Best and Final Offers. The request will include notice that discussions are concluded, an invitation to submit a revised Proposal with a Best and Final Offer, and a new submittal date and time.

E. The County reserves the right to make a Contract award without written and/or oral discussions with the Proposers and without an opportunity to submit Best and Final Offers when deemed to be in the County's best interests.

2-3 Evaluation of Responsiveness and Responsibility

Part of the evaluation process involves a determination of Responsiveness and Responsibility. The County may request that the Proposer Provide additional information, explanation and Documentation to be used in the determination. The requests for inform-

ation can occur at any point in the evaluation process. The additional information will normally be in the following subject areas:

A. Responsiveness:

The County will consider all the material submitted by the Proposer to determine whether the Proposer's offering is in compliance with the terms and conditions set forth in this RFP.

B. Responsibility:

1. The County will consider all the material submitted by the Proposer, and other evidence it may obtain otherwise, to determine whether the Proposer is capable of and has a history of successfully completing contracts involving cogeneration from internal combustion engines in the 2-3 MW range with digester gas as the primary fuel source. This may include requiring the Proposer to Provide references from customers who have been Provided the same or equivalent Goods or Services. References shall include the names and addresses of the parties to whom such Goods or Services were Provided and the name and phone number of contact Persons with such parties.

2. The following elements will be given consideration by the County in determining whether a Proposer is responsible:

   a. The ability, capacity and skill of the Proposer to perform the Contract or Provide the service required;

   b. The character, integrity, and reputation, of the Proposer;

   c. Whether the Proposer has the financial resources and experience to perform the Contract properly and within the times specified;

   d. The quality and timeliness of performance by the Proposer on previous contracts with the County and with other local governments and state and federal agencies, including, but, not limited to, the relative costs, burdens, time and effort necessarily expended by the County and such governments and agencies in securing satisfactory performance and resolving claims;

   e. The previous and existing compliance by the Proposer with laws relating to public contracts or Services, including, but not limited to, Disadvantaged Business Enterprise (DBE) and equal employment opportunity requirements;

   f. The history of the Proposer in filing claims and litigation on prior projects involving the County or on other public or private projects; and

   g. Such other information as may be secured having a bearing on the decision to award the Contract.

   When requested by the County, Proposers shall furnish acceptable evidence of the Proposer's ability to perform, such as firm commitments by Subcontractors, equipment, supplies and facilities, and the Proposer's ability to obtain the necessary

Personnel. Refusal to Provide such information when requested will cause the Proposal to be rejected.

3. Financial Resources

Submit proof of adequate financial resources which would be available to the Proposer for the prosecution and completion of the Work as required. The required financial information shall include:

a. Audited financial statements such as balance sheets, statements of income, statements of cash flow and stockholders' equity for each of the three most recently completed fiscal years, including notes to financial statements, independent accountants' reports and annual reports to stockholders;

b. Documentation of an open line of credit or other arrangement with an established bank under which adequate financing would be available for prosecution and completion of the Work called for hereunder;

c. Certification by the principal financial officer of or an independent accountant for the Proposer, stating that the Proposer has adequate financial resources for the prosecution and completion of the Work called for hereunder; and

d. The names, addresses and telephone numbers of at least one contact in the company's principal financial or banking organization and its independent auditor.

4. Financial Reporting

The Proposer shall Provide a current copy of its Dun and Bradstreet report if requested by the County.

5 Business Entity And Financial Information

a) Provide the name, address, and telephone number of legal entity with which Contract is to be written.

b) Provide the name, address and telephone numbers of principal officers (President, Vice-President, Treasurer, Chairperson of the Board of Directors, and other executive officers.)

c) Describe the legal status of the Proposer.

d) Provide the proposer’s business license numbers for states other than Washington.

e) List the names, titles, and telephone numbers of persons authorized to conduct Contract negotiations with King County.

f) Evidence of adequate financial stability is a prerequisite to award of a Contract regardless of any other consideration. The Proposer shall submit financial resources information according to Section 2-3 Responsiveness and Responsibility.

2-4 Evaluation Criteria

A. The PET will score each Proposal on the completeness and adequacy of the Proposer's responses and on additional available relevant information.

Although all responses to the Request for Proposal are important, certain aspects of the proposal may be more heavily considered than others. Life-cycle-cost is an important factor in making the final selection, however, the County is not required to choose the lowest proposed cost. The County will select the Proposer(s) that, in the County's sole discretion, best serves the overall needs of the County.

B. The evaluation of proposals may be based on criteria addressed anywhere else in the RFP.

C. In the event clarification questions are issued to Proposers or oral presentations are requested, the scoring will be adjusted to reflect the new information.

2-5 Evaluation Process

The evaluation process and scoring methodology of each phase of the process as follows In **Phase I**, the process eliminates those proposals that fall below King County's minimum requirements. The proposals that meet the minimum qualifications standards will then be comprehensively reviewed and scored as described in **Phase II**. The goal of this phase is to reduce the number of Proposers to a group whose proposals are within a competitive range of each other that will be considered in **Phase III**. Members of the Proposal Evaluation Team will meet and initially review all of the submitted proposals to determine if they meet the minimum qualifications. The Proposals that do not meet all of the following requirements may be deemed non-responsive.

A. **Phase I**: Initial Screening

Criteria to be considered include:

a. The proposal must include thorough responses to all of the sections identified in Section 1-17 of this RFP.

b. The Proposer's response to the request for References in Section 6-3 must demonstrate that the Proposer's team has in depth, relevant and successful experience with power generation system integration from design through installation through start up.

c. The Project Manager must have satisfactory prior experience as the lead person overseeing power generation facility integration from design through installation through start up for projects of the size and scope described in this RFP.

d. Evaluation of Responsiveness and Responsibility (*see* Section 2-3)

e. Proposer must be the engine-generator manufacturer or authorized engine generator manufacturer's representative.

f. Proposer must be able to demonstrate adequate parts availability.

g. Air emissions indicated by the Proposer in response to Subsection 6-5E of this RFP must not exceed the limits indicated in Section 7 -- 11093 – 1.04 D.

B. **Phase II**: Evaluation of Proposers that Meet Minimum Requirements

The Proposals that meet the minimum requirements will then be scored, to determine which proposal is the most advantageous to the County on the items listed below. The County may request further written clarification, meetings and may at any time enter into negotiation.

Scoring of Proposals

Section 6-3	References	150 Maximum Points
Section 6-4	Factory Information	150 Maximum Points
Section 6-5	Compliance with Tech Specification	300 Maximum Points
Section 6-6	Additional Technical and Performance Criteria	200 Maximum Points
Section 6-7	Project Cost (*Form 6-8.8*)	200 Maximum Points
Total possible score of		1000 points

C. **Phase III**: Final Evaluation

If more than one (1) Proposer remains after Phase II, a re-scoring process will be undertaken in Phase III with emphasis on areas that the County sees as critical to the success of the Power Generation Project. The re-scoring will be as follows:

Re - Scoring of Proposals

Section 6-3	References	50 Maximum Points
Section 6-4	Factory Information	100 Maximum Points
Section 6-5	Compliance with Tech Specification	150 Maximum Points
Section 6-6	Additional Technical and Performance Criteria	200 Maximum Points
Section 6-7	Life Cycle Cost	500 Maximum Points
Total possible score of		1000 points

2-6 Competitive Range

The evaluation of Proposers' proposals and subsequent additional information may result in successive reductions of the number of proposals that remain in the competitive range. The firms remaining in the competitive range may be invited, in the **Phase II** and/or **Phase III** evaluation, to participate in additional review and/or Best and Final Offer, and negotiations.

2-7 Negotiations

The County may enter negotiations with one or more Proposers to finalize Contract terms and conditions. In the event negotiations are not successful, the County may initiate negotiations with the next ranking Proposers or reject Proposals.

Negotiation of a Contract will be in conformance with applicable federal, state and local laws, regulations and procedures. The objective of the negotiations will be to reach agreement on all provisions of the proposed Contract.

2-8 Contract Award

Contract award, if any, will be made by the County to the responsible Proposer whose Proposal meets the requirements of the RFP, and will be the most advantageous to the County with respect to price, quality and other factors as evaluated by the County. The County is not required to award a Contract to the Proposer offering the lowest price. The County shall have no obligations until a Contract is signed between the Proposer and the County. The County reserves the right to award one or more contracts as it determines to be in its best interest.

2-9 Execution of Contract and Notice to Proceed

The Proposer to whom the County intends to award the Contract shall sign the Agreement and return it to the County. Upon authorization by the County Executive, or designee, a Contract will be issued. Upon receipt by King County of any required Documentation and Submittals by the Proposer, a Notice to Proceed may be issued, if appropriate.

2-10 Public Disclosure of Proposals

Proposals submitted under this RFP shall be considered public documents and with exceptions provided under public disclosure laws. Proposals which are recommended for Contract award will be available for inspection and copying by the public after the selection process has been concluded.

If a Proposer considers any portion of its Proposal to be protected under the law, the Proposer shall clearly identify each such portion with words such as "CONFIDENTIAL," "PROPRIETARY" or "BUSINESS SECRET." If a request is made for disclosure of such portion, the County will determine whether the material should be made available under the law. If the material is not exempt from public disclosure law, the County will notify the Proposer of the request and allow the Proposer five (5) Days to take whatever action it deems necessary to protect its interests, including obtaining a court order to prevent disclo-sure. If the Proposer fails or neglects to take such action within said period, the County will release the portions of the Proposal deemed subject to disclosure. By submitting a Proposal, the Proposer assents to the procedure outlined in this paragraph and shall have no claim against the County on account of actions taken under such procedure.

SECTION 3 - STANDARD CONTRACTUAL TERMS AND CONDITIONS

3-1 Administration

This Contract is between the County and the Supply Contractor who will be responsible for the Work described herein. The County is not party to defining the division of Work between the Supply Contractor and its Subcontractors, if any, and the Specifications have not been written with this intent.

The Supply Contractor represents that it has or will obtain all personnel and equipment required to perform Work hereunder. Such personnel shall not be current or former employees of the County without the written approval of the County. Any current or former County employee who is involved, or becomes involved, in the performance of the Contract must be disclosed according to Attachment G; and the County will determine whether conflicts of interest or ethical violations exist under the circumstances.

The Supply Contractor's performance under this Contract may be monitored and reviewed by a Project Manager or Project Representative appointed by the County. Reports and data required to be Provided by the Supply Contractor shall be delivered to the Project Manager. Questions by the Supply Contractor regarding interpretation of the terms, provisions and requirements of this Contract shall be addressed to the Buyer or the Project Manager for response.

3-2 Change Orders

The County may, at any time, without notice to the sureties, by written order, modify the Work as set forth in this Contract. No oral order or conduct by the County will constitute a Change Order unless confirmed in writing by the County. If a Change Order affects any outstanding purchase order from the County that purchase order shall be modified accordingly.

If any Change Order causes an increase or decrease in the cost of, or the time required for performance of any part of the Work under this Contract, an equitable adjustment in the Contract price, the Contract schedule, or both shall be made and the Contract and all related purchase order(s), modified in writing accordingly. Every Change Order may require a Cost/Price Analysis to determine the reasonableness of the proposed adjustments to Contract price or Schedule.

The Supply Contractor must assert its right to an adjustment under this clause within five (5) calendar Days after receipt of a written Change Order, or modification to purchase order, from the County. Upon request from the Supply Contractor, the County may extend the five (5) Day period. The request for equitable adjustment must be in writing and state the general nature and monetary extent of the claim. The County may require additional supporting documents and Cost or Price Analysis to determine the validity of the request for an equitable adjustment.

No request by the Supply Contractor for an equitable adjustment hereunder will be allowed if asserted after final payment under this Contract. No request will be allowed for any costs

incurred more than ten (10) Days before the Supply Contractor gives written notice, as required in this section.

3-3 Cost/Price Analysis

Cost/Price Analysis may be required by the County for the evaluation of proposals, Best and Final Offers, negotiations, Change Orders, terminations, revisions to Contract requirements or other circumstances as determined by the Buyer.

3-4 Termination for Convenience/Default/Non-Appropriation

A. Termination for Convenience

The County for its convenience may terminate this Contract, in whole or in part, at any time by written notice sent certified mail, return receipt requested, to the Supply Contractor. After receipt of a Notice of Termination, and except as directed by the Contract administrator, the Supply Contractor shall immediately stop Work as directed in the Notice, and comply with all other requirements in the Notice. The Supply Contractor shall be paid its costs, including necessary and reasonable Contract close-out costs and profit on that portion of the Work satisfactorily performed up to the date of termination as specified in the notice. The Supply Contractor shall promptly submit its request for the termination payment, together with detailed supporting Documentation. If the Supply Contractor has any property in its possession belonging to the County, the Supply Contractor will account for the same and dispose of it in the manner the County directs. All termination payment requests are subject to Cost/Price Analysis to determine reasonableness and compliance with the Contract, the Contract termination agreement, applicable laws and regulations.

B. Termination for Default

In addition to termination for convenience, if the Supply Contractor does not deliver Work in accordance with the Contract, or the Supply Contractor fails to perform in the manner called for in the Contract, or if the Supply Contractor fails to comply with any other material provisions of the Contract, the County may terminate this Contract, in whole or in part, for default. Termination shall be effected by serving a Notice of Termination by certified mail (return receipt requested) on the Supply Contractor setting forth the manner in which the Supply Contractor is in default and the effective date of termination; Provided that the Supply Contractor shall have ten (10) calendar Days to cure the default. The Supply Contractor will only be paid for Work delivered and accepted, or Work performed in accordance with the manner of performance set forth in the Contract less any damages to the County caused by or arising from such default. All termination payment requests are subject to Cost/Price Analysis to determine reasonableness and compliance with the Contract; the Contract termination agreement, applicable laws and regulations.

The termination of this Contract shall in no way relieve the Supply Contractor from any of its obligations under this Contract nor limit the rights and remedies of the County hereunder in any manner.

C. Termination for Non-Appropriation

If expected or actual funding is withdrawn, reduced or limited in any way prior to the termination date set forth in this Contract or in any amendment hereto, the County may, upon written notice to the Supply Contractor, terminate this Contract in whole or in part. Such termination shall be in addition to the County's rights to terminate for convenience or default.

In accordance with King County Code 4.04.040B.6, payment shall not exceed the appropriation for the year in which termination is effected. If the Contract is terminated for non-appropriation:

1. The County will be liable only for payment in accordance with the terms of this Contract for Work rendered prior to the effective date of termination; and,

2. The Supply Contractor shall be released from any obligation under this Contract or a related Purchase Order to Provide further Work pursuant to the Contract as are affected by the termination.

Funding under this Contract beyond the current appropriation year is conditional upon the appropriation by the County Council of sufficient funds to support the activities described in this Contract. Should such an appropriation not be approved, the Contract will terminate at the close of the current appropriation year. The appropriation year ends on December 31 of each year.

3-5 Force Majeure

The term "force majeure" shall include, without limitation by the following enumeration: acts of nature, acts of civil or military authorities, fire, accidents, shutdowns for purpose of emergency repairs, strikes and any other industrial, civil or public disturbances, causing the inability to perform the requirements of this Contract. If any party is rendered unable, wholly or in part, by Act of Nature or any other cause not reasonably within such party's control, to perform or comply with any obligation or condition of this Contract, upon giving notice and reasonably full particulars to the other party, such obligation or condition shall be suspended only for the time and to the extent reasonably necessary to restore normal operations. In the event the Supply Contractor ceases to be excused pursuant to this provision, then King County shall be entitled to exercise any remedies otherwise Provided for in this Contract, including Termination for Default.

3-6 Payment Procedures

A. Invoices

Invoices for Work, which has been delivered or Provided to the County shall be furnished by the Supply Contractor to:

King County Accounts Payable
M/S EXC-FI-0875
Exchange Building, 8th floor
821 Second Avenue
Seattle, Washington 98104-1598
Duplicate invoices shall be sent to the County's Project Manager at the following address:

King County Dept. of Natural Resources and Parks
Attn. Sue Hildreth
M/S KSC-NR-0507
201 South Jackson Street
Seattle, WA 98104

Important -- The County requires one correct invoice per pay request. All correct invoices must include the following information: Contract number, requester's name and phone number, date of invoice, invoice number, purchase order number, prompt payment discount and accurate total price for Work being invoiced. Failure to comply with this requirement may delay payment.

B. <u>Payment Schedule</u>

Within thirty (30) calendar Days after receipt of a correct invoice for each completed Payment Milestone, the County will pay the Supply Contractor for authorized Goods or Services satisfactorily performed and accepted. Acceptance of such payment by the Supply Contractor shall constitute full compensation for all Work.

1. Equipment Payment Milestones

   The Contract Price for equipment shall be apportioned pursuant the following Payment Milestones (*see* Section 7- 01014) and become payable as follows:

   a. **2%** **Preliminary Submittals -** Upon completion and County approval of all submittals required in advance of factory testing. (See Section 7.)

   b. **50%** **Factory Test** - Upon approval of submittals demonstrating completion of fabrication and acceptable factory testing.

   c. **18%** **Delivery** - Upon satisfactory delivery of all equipment to the Installation Contractor at the West Point job site.

   e. **30%** **Commissioning** - Upon completion of acceptable performance testing following acceptable installation by the Installation Contractor, start-up of all systems, delivery of acceptable final submittals, six (6) months of error-free, emission compliant operation, and Final Acceptance by the County *.

   * If installation and final acceptance of all equipment does not occur within 180 days after delivery of all equipment, the Supply Contractor may request that the remaining amount to be paid be deposited in an interest bearing account established in a financial institution certified as a public depository by the State of Washington. If the Supply Contractor complies with all requirements under this Contract, the Supply Contractor shall be entitled to all interest, if any, which has accrued in said account at the time of payment release by the County. The Supply Contractor shall make all arrangements with the County and complete the necessary forms and procedures to effect its election to have such monies deposited. If the Contractor fails to make such arrangements, the County will retain the monies in a fund with no interest thereon paid to the Supply Contractor. All expenses incurred

for depositing funds in said account shall be borne by the Supply Contractor except for administrative costs of the County.

2. Supply Contractor Field Services.

   Payment for manufacturer's on-site Services will be payable at the rate set in the Contract per person for each day or partial day of service specified in Section 7 or otherwise requested by the County and provided by the Supply Contractor. This daily rate shall be inclusive of all costs to perform the Work. Such payments will be made within 30 days of receipt of a correct invoice.

C. <u>Subcontractor Prompt Payment</u>

The Supply Contractor agrees to pay each of its Subcontractor(s) under this Con-tract for satisfactory performance of its Contract no later than 10 Days from the receipt of each payment the Supply Contractor receives from King County. Any delay or postponement of payment from the above referenced time frame may only be made for good cause following written approval of King County. The Supply Contractor agrees further to return retainage payments, if it withheld any, to each Subcontractor within 30 Days after the Subcontractor's Work is satisfactorily completed pursuant to applicable Washington State law.

3-7 Washington State Sales Tax

The County will make payment directly to the State for all applicable State sales taxes in case the Supply Contractor is not registered for payment of sales taxes in the State of Washington. If the Supply Contractor is so registered, it shall add the sales tax to each invoice and upon receipt of payment from the County, promptly remit appropriate amounts to the State of Washington.

3-8 Taxes, Licenses, and Certificate Requirements

This Contract and any of the Work Provided hereunder are contingent and expressly con-ditioned upon the ability of the Supply Contractor to Provide the specified Goods or Services consistent with federal, state and local law and regulations. If, for any reason, the Supply Contractor's required licenses or certificates are terminated, suspended, revoked or in any manner modified from their status at the time this Contract becomes effective, the Supply Contractor shall notify the County immediately of such condition in writing.

The Supply Contractor shall maintain and be liable for all taxes, fees, licenses and costs as may be required by federal, state and local laws and regulations for the conduct of business by the Supply Contractor and any subcontractors and suppliers shall secure and maintain such licenses and permits as may be required to Provide the Work under this Contract.

3-9 Price Warranty

The Supply Contractor warrants that the prices charged the County do not exceed the prices charged by the Supply Contractor to any other customer purchasing the same product or service in like or similar quantities, and under similar terms and conditions.

3-10 Defective Work, Materials or Services

Prior to Final Acceptance hereunder, when and as often as the County determines that the Work furnished under the Contract is not fully and completely in accordance with any requirement of the Contract, it may give notice and description of such non-compliance to the Supply Contractor. Within seven (7) calendar Days of receiving such written notification, the Contractor must supply the County with a detailed, written plan which indicates the time and methods needed to bring the Work within compliance with the Specifications. The County may reject or accept this plan at its discretion. In the event this plan is rejected, the Work will be deemed not accepted and returned to the Supply Contractor at the Supply Contractor's expense. This procedure to remedy defects is not intended to limit or preclude any other remedies available to the County by law, including those available under the Uniform Commercial Code, Title 62A RCW.

3-11 No Waiver of Warranties and Contract Rights

Conducting of tests and inspections, review of Specifications or plans, payment for a product or service or acceptance, or Final Acceptance of a product or service by the County shall not constitute a waiver, modification or exclusion of any express or implied warranty or any right under this Contract or in law.

3-12 Assignment

No party shall assign any interest, obligation or benefit under or in this Contract or transfer any interest in the same, whether by assignment or novation, without prior written consent of the other party. If assignment is approved, this Contract shall be binding upon and inure to the benefit of the successors of the parties. This provision shall not prevent Supply Contractor from pledging any proceeds from this Contract as security to a lender. An assignment shall be accepted by either party upon the posting of all required bonds, securities and the like by the assignee, and the written Agreement by assignee to assume and be responsible for the obligations and liabilities of the Supply Contractor or County, known and unknown, under this Agreement and applicable law.

3-13 Indemnification and Hold Harmless

To the maximum extent permitted by law and except to the extent caused by the sole negligence of the County, the Supply Contractor shall indemnify and hold harmless King County, its officers, officials, agents and employees, from and against any and all suits, claims, actions, losses, costs, penalties and damages of whatsoever kind or nature arising out of, in connection with, or incidental to the Goods and /or Services Provided by or on behalf of the Supply Contractor. In addition, the Supply Contractor shall assume the defense of King County and its officers and employees in all legal or claim proceedings arising out of, in connection with, or incidental to such Goods and/or Services: shall pay all defense expenses, including reasonable attorney's fees, expert fees and costs incurred by King County on account of such litigation or claims. This indemnification obligation shall include, but is not limited to, all claims against King County by an employee or former employee of the Supply Contractor or its subcontractors, and the Supply Contractor, by mutual negotiation, expressly waives all immunity and limitation on liability, as respects the County only, under any industrial insurance act, including Title 51 RCW, other Worker's compensation act, disability benefit act, or other employee benefit act of any jurisdiction which would otherwise be applicable in the case of such claim. In the event that the County incurs any judgment, award and/or cost including attorney's fees arising from the provisions of this paragraph, or to enforce the provisions of this paragraph, any such judgment, award,

fees, expenses and costs shall be recoverable from the Supply Contractor. In the event of litigation between the parties to enforce the rights under this paragraph, reasonable attorney fees shall be allowed to the prevailing party.

3-14 Applicable Law and Forum

Except as hereinafter specifically Provided, this Contract shall be governed by and construed according to the laws of the State of Washington, including, but not limited to, the Uniform Commercial Code, Title 62A RCW. Any suit arising here from shall be brought in the King County Superior Court or U.S. District for the Western District of Washington, in Seattle, either forum shall have sole and exclusive jurisdiction and venue.

3-15 Conflicts of Interest and Non-Competitive Practices

A. Conflict of Interest

The Supply Contractor, by entering into this Contract with the County to perform or Provide Work, Services or materials, has thereby covenanted that it has no direct or indirect pecuniary or proprietary interest, and that it shall not acquire any interest, which conflicts in any manner or degree with the Work, Services or materials required to be performed and/or Provided under this Contract and that it shall not employ any Person or agent having any such interest. In the event that the Supply Contractor or its agents, employees or representatives hereafter acquires such a conflict of interest, it shall immediately disclose such interest to the County and take action immediately to eliminate the conflict or to withdraw from this Contract, as the County may require.

B. Contingent Fees and Gratuities

The Supply Contractor, by entering into this Contract with the County to perform Work or provide Goods and Services, has thereby covenanted:

1. No Person or selling agency except bona fide employees or designated agents or representatives of the Supply Contractor has been or will be employed or retained to solicit or secure this Contract with an agreement or understanding that a commission, percentage, brokerage, or contingent fee would be paid; and

2. No gratuities, in the form of entertainment, gifts or otherwise, were offered or given by the Supply Contractor or any of its agents, employees or representatives, to any official, member or employee of the County or other governmental agency with a view toward securing this Contract or securing favorable treatment with respect to the awarding or amending, or the making of any determination with respect to the performance of this Contract.

3-16 Disputes, Claims and Appeals

The Supply Contractor shall address questions or claims regarding meaning and intent of the Contract or arising from this Contract in writing to the Buyer, within ten (10) calendar Days of the date in which the Supply Contractor knows or should know of the question or claim. The Buyer will ordinarily respond to the Supply Contractor in writing with a decision, but absent such written response, the question or claim shall be deemed denied upon the tenth Day following receipt by the Buyer.

In the event the Supply Contractor disagrees with any determination or decision of the Buyer, the Supply Contractor may, within five (5) calendar Days of the date of such determination or decision, appeal the determination or decision in writing to the Procurement and Contract Services Section Manager. Such written notice of appeal shall include all documents and other information necessary to substantiate the appeal. The Procurement and Contract Services Section Manager will review the appeal and transmit a decision or determination in writing. The decision will be considered final. Appeal to the Procurement and Contract Services Section Manager shall be a condition precedent to litigation hereunder.

All claims, counterclaims, disputes and other matters in question between the County and the Supply Contractor that are not resolved between the Procurement and Contract Services Section Manager and the Supply Contractor or through alternative dispute resolution will be decided in the Superior Court of King County, Washington, or the U.S. District Court for the Western District of Washington in Seattle, which shall have exclusive jurisdiction and venue over all matters in question between the County and the Supply Contractor. Mediation or arbitration are not mandatory prerequisites to filing a lawsuit.

Pending final decision of a dispute hereunder, the Supply Contractor shall proceed diligently with the performance of the Contract and in accordance with the direction of the Buyer. Failure to comply precisely with the time deadlines under this Subsection as to any claim shall operate as a waiver and release of that claim and an acknowledgment of prejudice to the County.

3-17 Mediation and Arbitration

Nothing in this paragraph precludes any party from seeking relief from King County Superior Court or the U.S. District Court for the Western District of Washington, in Seattle. If a dispute arises out of or relates to this Contract, or the breach thereof, and if said dispute cannot be settled through direct discussions, the parties may agree to first endeavor to settle the dispute in an amicable manner by mediation. Thereafter, any unresolved controversy or claim arising out of or relating to this Contract, or breach thereof, may be settled by arbitration, and judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The parties to this Contract may seek to resolve disputes pursuant to mediation or arbitration, but are not required to do so.

3-18 Retention of Records, Audit Access and Proof of Compliance with Contract

A. <u>Retention of Records</u>

1. The Supply Contractor shall maintain books, records and documents of its performance under this Contract in accordance with generally accepted accounting principles. The Supply Contractor shall maintain and retain for a period of not less than six (6) years after the date of Final Acceptance of Contract Work and all other pending matters are closed; all financial information, data and records used to prepare and support the Supply Contractor's final proposal for this Contract and invoicing for the Work and any payments resulting from Change Orders or claims. In addition, the Supply Contractor shall maintain the financial information used in the preparation or support of any Change Orders or claims.

2. The Supply Contractor shall ensure that its Subcontractors and suppliers maintain and retain for no less than six (6) years all records pertaining to the performance by the Subcontractors and suppliers of their portions of the Work under this Contract.

B. Audit Access

1. The County and its authorized representatives and designees shall have access to all records maintained and retained by the Supply Contractor and its Subcontractors for the purpose of inspection, cost/Price Analysis, audit or other reasonable purposes related to this Contract. The County and its representatives and designees shall have access to records and be able to copy such records during the Supply Contractor's normal business hours. The Supply Contractor shall Provide proper facilities for such access, inspection and copying.

2. Audits may be conducted during or after the Contract period for purposes of evaluating claims by or payments to the Supply Contractor and for any other reason deemed appropriate and necessary by the County. Auditors selected and paid for by the County will conduct audits. Audits shall be conducted in accordance with generally accepted auditing standards and/or audit procedure and guidelines of the County. The Supply Contractor shall fully cooperate with the County or its auditor(s) during audits and inspections, and Provide all requested Documentation.

3. If an audit is commenced more than sixty (60) Days after the date of Final Acceptance of Contract Work, the County will give reasonable notice to the Supply Contractor of the date on which the audit will begin.

4. The Supply Contractor shall maintain records relating to the pricing of spare parts. The County will have access to such records for audit purposes.

5. The Supply Contractor may be required to sign a "Certificate of Current Cost or Pricing Data."

C. Proof of Compliance with Contract

The Supply Contractor shall, at any time when requested, submit to the County properly authenticated documents or other satisfactory proofs as to the Supply Contractor's compliance with such requirements.

In addition, the Supply Contractor will permit the County, or a duly authorized representative, to inspect all Work, materials, payrolls and other data and records involving the Contract.

3-19 Other Public Agency Orders

Other federal, state, county and local entities may utilize the terms and conditions established by this Contract if formally requested and approved by the Buyer The Washington State Interlocal Cooperative Act RCW 39.34 provides that other governmental agencies may purchase Goods and Services in accordance with the terms and prices of this contract if all parties are willing. A formal cooperative purchasing agreement will be executed in such cases. The County does not accept any responsibility or involvement in the purchase orders or contracts issued by other public agencies

3-20 Recycled Products Policy

The County promotes the purchase and utilization of recycled material and products where available. Recycled material means material and byproducts which have been recovered or diverted from solid waste disposal for the purpose of recycling. It does not include those materials and byproducts generated from, and commonly reused within, an original manufacturing process. In the event of similar pricing, availability and other factors affecting the solicitation, preference may be given to products containing recycled material.

The Supply Contractor shall, when requested by the Project Manager, Provide Documentation indicating the recycled materials used and their proportion of the total value of the end product. Where recycled materials were available but non-recycled materials were actually used, in whole or in part, the Supply Contractor shall furnish the content by price/volume of recycled and non-recycled material used, and shall furnish an explanation of the reason that recycled materials were not used.

3-21 Conflicts of Interest - Current and Former Employees

The County seeks to eliminate and avoid actual or perceived conflicts of interest and unethical conduct by current and former County employees in transactions with the County. Consistent with this policy, no current or former County employee may Contract with, influence, advocate, advise, or consult with a third party about a County transaction, or assist with the preparation of Proposals submitted to the County while employed by the County or within one (1) year after leaving the County's employment, if he/she was substantially involved in determining the Work to be done or process to be followed while a County employee.

All bidders, Proposers, vendors or contractors who anticipate contracting with the County must identify at the time of offer, such current or former County employees involved in preparation of bids/proposals or the anticipated performance of the Work or Services if awarded the Contract. This information should be included in Attachment G - "Current or Former County Employee Disclosure Form." Failure to identify former County employees involved in this transaction may result in the County's denying or terminating this Contract. In addition, after award, the Supply Contractor is responsible for notifying the County's Project Manager of current or former County employees who may become involved in the Contract any time during the term of the Contract.

3-22 Non-Discrimination and Equal Employment Opportunity

PART 1 – NON-DISCRIMINATION AND EQUAL EMPLOYMENT OPPORTUNITY

A. Nondiscrimination in Employment and Provision of Services. During the perfor-mance of this Contract, neither the Supply Contractor nor any party subcontracting under the authority of this Contract shall discriminate nor tolerate harassment on the basis of race, color, sex, religion, nationality, creed, marital status, sexual orientation, age, or the presence of any sensory, mental, or physical disability in the employment or application for employment or in the administration or delivery of Services or any other benefits under this Contract. King County Code Chapter 12.16 is incorporated herein by reference, and such requirements shall apply to this Contract.

B Nondiscrimination in Subcontracting Practices. During the solicitation, award and term of this Contract, the Supply Contractor shall not create barriers to open and fair opportunities to participate in County contracts or to obtain or compete for contracts and

subcontracts as sources of supplies, equipment, construction and Services. In considering offers from and doing business with subcontractors and suppliers, the Supply Contractor shall not discriminate against any person on the basis of race, color, creed, religion, sex, age, nationality, marital status, sexual orientation or the presence of any mental or physical disability in an otherwise qualified disabled person.

C. Compliance with Laws and Regulations. The Supply Contractor shall comply fully with all applicable federal, state and local laws, ordinances, executive orders and regulations that prohibit discrimination. These laws include, but are not limited to, RCW Chapter 49.60, Titles VI, VII of the Civil Rights Act of 1964, and the Restoration Act of 1987. The Supply Contractor shall further comply fully with any affirmative action requirements set forth in any federal regulations, statutes or rules included or referenced in the contract documents.

D. Small Business and Minority and Women Business Enterprises Opportunities. King County encourages the Supply Contractor to utilize small businesses, including Minority-owned and Women-owned Businesses Enterprises ("M/WBEs") in County contracts. The County encourages the Supply Contractor to use the following voluntary practices to promote open competitive opportunities for small businesses, including M/WBEs:

1. Attending a pre proposal conference, if scheduled by the County, to provide project information and to inform small businesses and other firms of contracting and subcontracting opportunities.

2. Placing all qualified small businesses, attempting to do business in King County, including M/WBEs, on solicitation lists, and providing written notice of subcontracting opportunities to these firms capable of performing the work, including without limitation all businesses on any list provided by the County, in sufficient time to allow such businesses to respond to the written solicitations.

3. Breaking down total requirements into smaller tasks or quantities, where economically feasible, in order to permit maximum participation by small businesses, including M/WBEs.

4. Establishing delivery schedules, where the requirements of this contract permit, that encourages participation by small businesses, including M/WBEs.

5. Providing small businesses, including M/WBEs that express interest with adequate and timely information about plans, specifications, and requirements of the Contract.

6. Using the services of available community organizations, contractor groups, local assistance offices, the County, and other organizations that provide assistance in the recruitment and placement of small businesses, including M/WBEs.

7. The Washington State Office of Minority and Women's Business Enterprises (OMWBE) can provide a list of certified M/WBEs. OMWBE may be reached at (360) 753-9693.

Further, the County encourages small businesses, including M/WBEs, to participate in the following practices to promote open competitive opportunities:

1. Attending a pre proposal conference, if scheduled by the County, to receive project information and to inform prime bidders/proposers of contracting and subcontracting capabilities.

2. Requesting placement on solicitation lists, and receipt of written notice of subcontracting opportunities.

3. Utilizing the services of available community organizations, contractor groups, local assistance offices, local publications including newspapers which advertise contracting opportunities, the County, and other organizations that provide assistance in the recruitment and placement of small businesses, including M/WBEs.

E. Equal Employment Opportunity. The Supply Contractor will implement and carry out the obligations in its Affidavit and Certificate of Compliance regarding equal employment opportunity, and all other requirements as set forth in the Affidavit and Certificate of Compliance.

F. Unfair Employment Practices. King County Code Chapter 12.18 is incorporated by reference as if fully set forth herein and such requirements apply to this Contract. During the performance of this Contract, neither the Supply Contractor nor any party subcontracting under the authority of this Contract shall engage in unfair employment practices. It is an unfair employment practice for any:

1. Employer or labor organization to discriminate against any person with respect to referral, hiring, tenure, promotion, terms, conditions, wages or other privileges of employment;

2. Employment agency or labor organization to discriminate against any person with respect to membership rights and privileges, admission to or participation in any guidance program, apprenticeship training program, or other occupational training program;

3. Employer, employment agency, or labor organization to print, circulate, or cause to be printed, published or circulated, any statement, advertisement, or publication relating to employment or membership, or to use any form of application therefore, which indicates any discrimination unless based upon a bona fide occupation qualification;

4. Employment agency to discriminate against any person with respect to any reference for employment or assignment to a particular job classification;

5. Employer, employment agency or a labor organization to retaliate against any person because this person has opposed any practice forbidden by KCC Chapter 12.18 or because that person has made a charge, testified or assisted in any manner in any investigation, proceeding or hearing initiated under the provisions of KCC Chapter 12.18;

6. Publisher, firm, corporation, organization or association printing, publishing or circulating any newspaper, magazine or other written publication to print or cause to be printed or circulated any advertisement with knowledge that the same is in violation of KCC Chapter 12.18.030.C., or to segregate and separately designate

advertisements as applying only to men and women unless such discrimination is reasonably necessary to the normal operation of the particular business, enterprise or employment, unless based upon a bona fide occupational qualification; and/or

7. Employer to prohibit any person from speaking in a language other than English in the workplace unless:

   a. The employer can show that requiring that employees speak English at certain *times* is justified by business necessity, and

   b. The employer informs employees of the requirement and the consequences of violating the rule.

G. Record-Keeping Requirements and Site Visits. The Supply Contractor shall main-tain, for at least 12 months after completion of all work under this Contract, the following:

1. Records of employment, employment advertisements, application forms, and other pertinent data, records and information related to employment, applications for employment or the administration or delivery of Services or any other benefits under this Contract; and

2. Records, including written quotes, bids, estimates or proposals submitted to the Supply Contractor by all businesses seeking to participate on this Contract, and any other information necessary to document the actual use of and payments to subcontractors and suppliers in this Contract, including employment records or records relating to the use of Disadvantaged Business Enterprises (DBEs).

   The County may visit, at any time, the site of the work and the Supply Contractor's office to review the foregoing records. The Supply Contractor shall provide every assistance requested by the County during such visits. In all other respects, the Supply Contractor shall make the foregoing records available to the County for inspection and copying upon request. If this Contract involves federal funds, the Supply Contractor shall comply with all record keeping requirements set forth in any federal rules, regulations or statutes included or referenced in the contract documents.

H. Sanctions for Violations. Any violation of the mandatory requirements of the provisions of this Section shall be a material breach of contract, for which the Supply Contractor may be subject to damages, withholding payment and any other sanctions provided for by contract and by applicable law.

PART 2 - REQUIRED SUBMITTALS

A. Required Submittals Prior to Contract Execution. For public works contracts valued at $10,000 or more, and for all other contracts valued at $25,000 or more, contractors entering into a contract or agreement with King County shall, within ten (10) days after the bidder receives the written notice of selection, submit the following:

1. A Personnel Inventory Report on the form provided by the County.

2. An Affidavit and Certificate of Compliance demonstrating the Supply Contractor's commitment to comply with the provisions of KCC Chapter 12.16.

3. When this Contract is for Public Works provide, if applicable, a Statement of Compliance with KCC Chapter 12.16 from any labor unions or employee referral agencies which refers workers or employees or provides or supervises apprenticeship or other training programs from whom Supply Contractor obtains employees.

4. Except for Contractors only supplying Goods, a 504/ADA Disability Assurance of Compliance on the form provided by the County.

5. Assistance with the requirements of this Section and copies of Chapters 12.16 and 12.18 is available by contacting the Office of Business Relations and Economic Development at the address below. Please include the contract number in all correspondence.

King County
Office of Business Relations and Economic Development
821 Second Avenue, Mail Stop: EXC-FI-0355
Seattle, WA 98104-1598
Phone: (206) 684-1330 Fax: (206) 263-4597

The County will not execute any agreement or contract without prior receipt of fully executed forms listed in paragraph A above.

B. Required Submittals During Work when the Contract is for Public Works.

The Supply Contractor shall collect, submit and update the submittals listed below for itself, its subcontractors and any sub tier subcontractors and suppliers, to the Office of Business Relations and Economic Development. Such subcon-tractor information shall be submitted prior to the County processing and paying any progress payment that includes such subcontractor work.

1. An Affidavit and Certificate of Compliance demonstrating subcontractors' commitment to comply with the provisions of KCC Chapter 12.16; a Personnel Inventory Report; and Statement of Compliance.

2. Affidavits of Amounts Paid. Upon completion of all Work and as a condition precedent to final payment, the Supply Contractor shall submit a final Affidavit of Amounts Paid, to the Office of Business Relations and Economic Development. Identify amounts actually paid, and any amounts owed, to each subcontracting firm and/or supplier for performance under the Contract. Failure to submit such

affidavits may result in withholding of payments or the final payment. King County will provide affidavit forms.

PART 3 – COMPLIANCE WITH SECTION 504 OF THE REHABILITATION ACT OF 1973 AS AMENDED AND THE AMERICAN WITH DISABILITIES ACT OF 1990

Except for Contractors only supplying Goods, the Supply Contractor shall complete a Disability Self-Evaluation Questionnaire for all programs and Services offered by the Supply Contractor (including any Services not subject to this Contract) and shall evaluate its Services, programs and employment practices for compliance with Section 504 of the Rehabilitation Act of 1973, as amended ("504"), and the Americans with Disabilities Act of 1990 ("ADA"). The Supply Contractor shall complete a 504/ADA Disability Assurance of Compliance and shall, within ten days after the bidder receives written notice of selection, submit it to the County. Such Assurance of Compliance will be incorporated herein by this reference.

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SECTION 4 - SPECIFIC CONTRACTUAL TERMS AND CONDITIONS

4-1 Execution of the Contract Agreement

The Contract is effective when King County countersigns the Contract Agreement page; the date the Contract is countersigned is the Contract execution date. No other act of the County shall constitute Contract award. The Contract Agreement page is the bilaterally signed page in the Contract depicting the order of precedence of the Contract Documents.

The Contract Agreement may be executed in two counterparts, each of which shall be deemed an original and which shall together constitute one Contract.

4-2 Contract Documents and Precedence

The documents constituting the Contract between the County and the Supply Contractor are intended to be complementary so that what is required by any one of them shall be as binding as if called for by all of them. In the event of any conflicting provisions or requirements within the several parts of the Contract Documents, they shall take precedence as listed on the Contract Agreement, pg. 2.

4-3 Contract Term

This Contract shall commence on the Contract execution date [*See* Contract Agreement (Sample) pg. 2] and shall continue until the Work is completed (a period of calendar days to be established in the Contract) unless terminated per Section 2-4 Termination for Convenience/Default/Non-Appropriation. *See* Section 4-9 and Section 7-01014 for Contract Milestone dates and time periods. During the Term of the Contract, all terms and conditions of this Contract shall remain in effect except those amended by Change Order. An additional Contract time period will be established in the Contract for the option to purchase a third engine generator system.

4-4 Notices

All notices or reports which are required or may be given pursuant to this Contract shall be in writing and shall be deemed duly given when delivered to the respective Executive offices of Supply Contractor and County at the address first set forth below.

King County	Supply Contractor
(To be determined)	(To be determined)

For contractual questions prior to Notice to Proceed contact:
King County Procurement and Contract Services Section
M.S. EXC-FI-0871
Exchange Building, 8th Floor
821 Second Ave.
Seattle, WA. 98104-1598
Attn: Paul Russell
(206) 684-1054
paul.russell@metrokc.gov

4-5 Shipping Charges

All prices shall include freight FOB to the designated delivery point. Requests for additional compensation for freight charges will be rejected by the County.

4-6 Cost Proposals for 'Change Order' Work

Direct costs for additional work shall be billed at cost without markup, as noted below or as revised by legislative action of the Council:

Reimbursement of Supply Contractor travel, lodging and meal expenses are limited to the eligible costs based on the rates and criteria established in King County Code, chapter 3.24.

A. The mileage rate allowed by King County shall not exceed the current Internal Revenue Services (IRS) rates per mile as allowed for business related travel. The IRS mileage rate will be paid for the operation, maintenance and depreciation of individually owned vehicles for that time which the vehicle is used during Work hours. Parking shall be the actual cost. When rental vehicles are authorized, government rates shall be requested. If a Person does not request government rates, he/she may be Personally responsible for the difference. Please reference the IRS web site for current rates. http://www.irs.gov/.

B. Reimbursement for meals shall be limited to the per diem rates established by Federal travel requisitions for the host city in the code of Federal Regulations, 41 CFR § 301, App.A.

C. Accommodation rates shall not exceed the Federal Lodging limit plus host city taxes. The Supply Contractor must always request government rates.

D. The direct costs contained in A, B and C above will only be authorized by the King County Project Manager for Supply Contractor staff living beyond commuting distance, normally considered to be for the travel beyond 100 miles of 821 Second Avenue, Seattle, WA.

E. Air travel shall be by coach class at the lowest price available at the time the King County Project Manager requests a particular trip. In general, a trip is associated with a particular Work activity of limited duration and only one round-trip ticket, per Person, will be billed per trip.

F. Cost for equipment, materials and supplies, such as approved equipment rental; telephone, telegraph and cable expenses; reproduction costs including blueprinting, photographing, telecopying, mimeographing, photocopying and printing; express charges; commercial printing, binding, art Work and models; and, computer programming and data entry costs shall be billed without markup.

G. Authorized subcontract Services; Provided that the limitations set forth in the above paragraphs shall be applicable to such subcontract Services.

H. Other direct costs, not listed above, may be billed if the County has given prior approval.

I. Supply Contractor shall not mark up Subcontractor costs and Other Direct Costs (ODCs). The cost for Subcontractor management shall be segregated into a single cost item and included as a separate task in the cost proposal in Section 6-8.

J. Receipts required for purchases $10 and over, not including meals.

4-7 Guarantee/Warranty

A. The Supply Contractor guarantees the Goods and Services furnished under this Contract will be free from defects in material and workmanship, and will conform with all requirements of this Contract, for a period of one (1) year from date of **Final Acceptance** of such Goods and/or Services by the County. The Supply Contractor is responsible for all costs of replacement, including shipping charges, for Goods or Services found defective within that period, regardless of who actually corrects the defect.

B. The County shall give written notice of any defect to the Supply Contractor. If the Supply Contractor has not corrected defect with thirty (30) calendar Days after receiving the written notice, the County, in its sole discretion, may correct the defect itself. In the case of an emergency where the County believes delay could cause serious injury, loss or damage, the County may waive the written notice and correct the defect. In either case, the County will charge-back the cost for such warranty repair to the Supply Contractor.

C. The Supply Contractor shall ensure that the warranty requirements of this Contract are enforceable through and against the Supply Contractor's suppliers, vendors, distributors and Subcontractors. The Supply Contractor is responsible for liability and expense caused by any inconsistencies or differences between the warranties extended to the County by the Supply Contractor and those extended to the Supply Contractor by its suppliers, vendors, distributors and Subcontractors. Such inconsistency or difference will not excuse the Supply Contractor's full compliance with its obligations under this Contract.

D. The Supply Contractor, upon notice of award of the Contract, shall promptly Provide to the County complete copies of all written warranties or guarantees and/or Documentation of any other arrangement relating to such warranties or guarantees extended to the Supply Contractor by the Supply Contractor's suppliers, vendors, distributors and Subcontractors covering parts, components, subcomponents and systems procured through this Contract.

E. The Supply Contractor shall ensure the County receives warranty related Work from its suppliers, distributors, and Subcontractors. The Supply Contractor shall cooperate with the County in facilitating warranty related Work by such suppliers, vendors, distributors and Subcontractors. If the original parts or equipment manufacturer Provides a warranty that is greater in scope or duration than the Supply Contractor's warranty to the County, the County shall receive the increased warranty benefits.

F. The termination of this Contract shall in no way relieve the Supply Contractor from its warranty/guarantee responsibility.

G. Any Goods or Services corrected shall be subject to this Subsection to the same extent as the Goods or Services initially Provided.

H. This guarantee shall be in addition to any other express warranties or any implied warranties or remedies Provided by this Contract or by law, and in addition to any other

rights or remedies available to the County under this Contract or by law. No provision in this Subsection shall be construed to limit the liability of the Supply Contractor for Work not done in accordance with the Contract. The liability for such failure to perform shall extend as far as the appropriate periods of limitation provided by law.

I. (*See* Warranty and Guarantee in Section 7-11093 Part 1.06)

4-8 Express Warranties

A. Supply Contractor warrants that the Engine-Generator supplied shall meet the minimum emissions and efficiency requirements specified in Section 7 and in the Proposer's responses to Section 6, and that when used in accordance with user manuals, the Engine-Generator shall operate and conform to the Scope of Work, performance capabilities. Specifications, functions and other descriptions and standards as identified in this Contract and all supplemental information Provided by Supply Contractor.

B. Supply Contractor warrants that all equipment supplied as part of this Contract will not in any way constitute an infringement or other violation of any copyright, trade secret, trademark, patent, invention, proprietary information, nondisclosure or other right of any third party.

C. The Supply Contractor will be responsible for providing and implementing a Soft-ware system that is successfully integrated into the existing system environment of King County and meets the functional requirements as specified in this Request for Proposals.

4-9 Liquidated Damages

A. Time is of the essence on each and every portion of the Contract. In the Contract a definite and certain length of time will be fixed for the fulfillment of the established Contract Milestones. After Contract execution, only a Change Order will change these Contract Milestones. Preliminary Contract Milestones are indicated in Section 7-01014.

B. For each calendar Day after a Milestone date that the specified Work remains uncompleted, or non-compliant the Supply Contractor shall pay the County the sum of $2,500.00 per Day as Liquidated Damages, not as a penalty.

C. The Supply Contractor authorizes the County to deduct such Liquidated Damages from the amount due, or to become due, under the Contract. The Supply Con-tractor further agrees that any such deduction shall not in any degree release the Supply Contractor from further obligation and liabilities in regard to the fulfillment of the entire Contract.

4-10 Hazardous Chemical Communication

In order to comply with WAC 296-62-054, Hazard Communication, the Supply Contractor shall submit with the Proposal, a Material Safety Data Sheet (MSDS) for all products containing any toxic products that may be harmful to the end user. The MSDS Sheet is to accompany the toxic product(s) to the specified delivery sites.

Include the following information in the MSDS:

A. Chemical Abstract Service (CAS) numbers for every chemical that is listed in the MSDS.

B. If the product is actually used diluted, the dilution rate should be so stated in the MSDS and the hazards and corresponding Personal protection, etc. also be listed.

C. SARA Title 3 chemicals must be listed with the percentage by weight of the total product.

D. A statement as to the intended use of the product.

4-11 Industrial and Hazardous Waste

The Supply Contractor shall comply with all applicable local ordinances, state and federal statutes, and supporting rules and regulations governing the discharge of industrial waste to a public sewer, private sewer, or side sewer tributary to the metropolitan sewerage system.

Supply Contractor shall handle and dispose of all hazardous wastes in compliance with all applicable local, state and federal laws and regulations, including the Resource Conservation and Recovery Act, the Washington Hazardous Waste Management Act, and applicable rules and regulations of the Environmental Protection Agency and the Department of Ecology governing the generation, storage, treatment, transportation or disposal of hazardous wastes.

4-12 Prohibition on Asbestos-Containing Products

Asbestos-containing products shall not be Provided to the County under this Contract, unless no practicable alternative for the asbestos-containing product exists and the Supply Contractor obtains the written consent of the County. The Supply Contractor shall notify the County in writing at least sixty (60) Days before it plans to supply the County with an asbestos-containing product. The County shall respond to such notification within thirty (30) Days of receipt. The Supply Contractor shall comply with applicable state, federal and local labeling and other laws, regulations and ordinances pertaining to asbestos-containing products, including, but not limited to, the State of Washington Industrial Safety and Health Act and the federal Occupational Safety and Health Act.

4-13 Patents and Royalties

The Supply Contractor is responsible for paying all license fees, royalties or the costs of defending claims for the infringement of any patented invention, article, process or method that may be used in performing this Contract or with the completed Work. The Supply Contractor and the Supply Contractor's sureties shall indemnify and hold the County, together with its officers and employees, harmless against any and all demands made for such fees, royalties or claims brought or made by the holder of any invention or patent. Before final payment is made on the account of this Contract, the Supply Contractor shall, if requested by the County, furnish acceptable proof of a proper release from all such fees or claims.

Should the Supply Contractor, its agent, servants or employees, or any of them be enjoined from furnishing or using any invention, article, material, computer programs or equipment supplied or required to be supplied or used under the Contract, the Supply Contractor shall notify the County in writing and promptly substitute other articles, materials, computer programs or equipment in lieu thereof of equal efficiency, quality, finish, suitability and market value, and be satisfactory in all respects to the County.

4-14 Design Defects

The County will declare a design defect in the event that a part or component fails at less than 80 percent of its design life more than twice during the warranty period. The County will notify the Supply Contractor of the defect in writing; the Supply Contractor shall Provide a modification, redesign or a plan to correct the defect within 30 calendar Days of receipt of the notification. In addition, the Supply Contractor shall provide and install replacement parts or components promptly at no expense to the County until the redesigned parts or components are available. Redesigned parts or components shall be installed at the sole expense of the Supply Contractor.

The warranty period and terms for corrected items shall be the same as for the initial items purchased under this Contract.

In the event that during the warranty period repairs or modifications made necessary by design defects are not completed due to the lack of material or the inability to Provide the proper repair, the extended period of the lack of correction shall not be considered in computing the warranty end date. The same warranty will remain in effect until a correction is implemented. Warranty on items determined to be design defects shall be extended for the time and/or miles of the original warranty. This extended warranty shall begin on the repair/replacement date of the redesign or modification for any corrected failures.

4-15 Prices

Prices shall remain firm for the duration of the Contract (*See* Section 4-3 Term).

4-16 Final Acceptance

King County shall give Final Acceptance of the Work following the Supply Contractor's completion of all Work in accordance with the Contract including the commissioning period of six months of continuous successful and error-free operation. If the work is deemed unacceptable by King County, the County shall notify the Supply Contractor within 30 days following the testing or commissioning period. The Supply Contractor shall then correct the unacceptable conditions and restart the testing or commissioning periods. The correction, testing, and commissioning shall be repeated until the work is fully acceptable.

4-17 Nondisclosure of Data

Data Provided by King County either before or after Contract award shall only be used for its intended purpose. Proposers, Vendors, Contractors and Subcontractors shall not utilize nor distribute the King County data in any form without the express written approval of King County.

4-18 Non-Disclosure Obligation

While providing the Service required under this Contract, the Supply Contractor may encounter licensed technology, Software, Documentation, drawings, schematics, manuals, data or other materials marked “Confidential”, “Proprietary” or “Business Secret”. The Supply Contractor shall, with regard to such information and material received or used in performance of this Contract, employ practices no less than those used for the protection of the Supply Contractor’s own confidential information.

The Contract imposes no obligation upon the Supply Contractor with respect to confidential information which the Supply Contractor can establish that: a) was in the possession of, or was rightfully known by the Supply Contractor without an obligation to maintain its confidentiality prior to receipt from King County or a third (3rd) party; b) is or becomes generally known to the public without violation of this Agreement; c) is obtained by the Supply Contractor in good faith from a third (3rd) party having the right to disclose it without an obligation of confidentiality; or, d) is independently developed by the Supply Contractor without the participation of individuals who have had access to King County’s or the third (3rd) party’s confidential information. The Supply Contractor may disclose confidential information if so required by law, Provided that the Supply Contractor notifies King County that the third (3rd) party of such requirement prior to disclosure.

4-19 Public Disclosure Requests

Contracts shall be considered public documents and, with exceptions Provided under public disclosure laws, will be available for inspection and copying by the public. All Software products Provided by the Supply Contractor under this Contract are copyrighted and are proprietary to the Supply Contractor.

If a Supply Contractor considers any portion of the items including Software, data and Related Materials, delivered to King County to be protected under the law, the Supply Contractor shall clearly identify each such item with words such as "CONFIDENTIAL," "PROPRIETARY" or "BUSINESS SECRET." If a request is made for disclosure of such item, the County will determine whether the material should be made available under the law. If the material or parts thereof are determined by King County to be exempt from public disclosure, King County will not release the exempted documents. If the material is not exempt from public disclosure law, the County will notify the Supply Contractor of the request and allow the Supply Contractor ten (10) Days to take whatever action it deems necessary to protect its interests. If the Supply Contractor fails or neglects to take such action within said period, the County will release the item deemed subject to disclosure. By signing a Contract, the Supply Contractor assents to the procedure outlined in this paragraph and shall have no claim against the County on account of actions taken under such procedure.

4-20 No Prototype Components

All proposed hardware, Software and associated items, should be in production and be used by customers comparable to King County at the time of the proposal. Test or prototype items must be clearly identified as such. A sufficient inventory of the proposed product must be available to meet delivery requirements.

4-21 Changed Requirements

New Federal, State and County laws, regulations, ordinances, policies and administrative practices may be established after the date this Contract is established and may apply to this Contract. To achieve compliance with changing requirements, the Supply Contractor

agrees to accept all changed requirements that apply to this Contract and require Subcontractors to comply with revised requirements as well. Changed requirements will be implemented through Subsection 3-2, Change Orders.

4-22 Patents, Copyrights and Rights in Data

Any patentable result or materials suitable for copyright arising out of this Contract shall be owned and retained by the County. The County in its sole discretion shall determine whether it is in the public's interest to release or make available any patent or copyright.

The Supply Contractor agrees that the ownership of any plans, drawing, designs, Specifications, computer programs, technical reports, operating manuals, calculations, notes and other Work submitted or which is specified to be delivered under this Contract, whether or not complete (referred to in this Subsection as "Subject Data") shall be vested in the County.

All such Subject Data furnished by the Supply Contractor pursuant to this Contract, other than documents exclusively for internal use by the County, shall carry such notations on the front cover or a title page (or in such case of maps, in the name block) as may be requested by the County. The Supply Contractor shall also place its endorsement on all Supply Contractor-furnished Subject Data. All such identification details shall be subject to approval by the County prior to printing.

The Supply Contractor shall ensure that the substance of foregoing paragraphs are included in each subcontract for the Work under this Contract.

4-23 Performance and Payment Bond

The Proposer to whom the County wards this Contract shall furnish a performance and payment bond on the form Provided in Attachment C, “Performance and Payment Bond,” in the amount of 100 percent of the Contract Price as security for the faithful performance of the Work, including the payment of all Persons furnishing materials and performing labor on the Work, and all payments arising from the performance of the Work due the State of Washington pursuant to Titles 50 and 51 RCW. Such bond shall be submitted within ten (10) calendar Days of receipts of a written request from the County. Such bond must be executed by a duly licensed surety company, which is registered with the Washington State Insurance Commissioner, and the surety’s name shall appear in the current Authorized Insurance Company List in the State of Washington published by the Office of the Insurance Commissioner. the scope of the performance and payment bond or the form thereof prescribed in Attachment C shall in no way affect or alter the liabilities of the Supply Contractor to the County under Subsection “Indemnification.”

The County may require the sureties or surety company to appear and qualify themselves upon the bond. If at any time, the County determines, in its sole judgment, that the sureties or surety company are insufficient, the County may require the Supply Contractor to furnish additional surety in form and arrangement satisfactory to the County and in an amount not exceeding that originally required. Payments will not be made on the Contract until sufficient surety as required is furnished.

Failure by the Proposer to submit a satisfactory performance and payment bond shall be grounds for disqualifying the Proposer from further participation in this RFP and result in forfeiture of the proper Proposal security.

4-24 Severability and Nonwaiver of Breach

Whenever possible, each provision of this Agreement Will be interpreted to be effective and valid under applicable law. If any provision is found to be invalid, illegal or unenforce-able, then such provision or portion thereof Will be modified to the extent necessary to render it legal, valid and enforceable and have the intent and economic effect as close as possible to the invalid, illegal and unenforceable provision. If it is not possible to modify the provision to render it legal, valid and enforceable, then the provision Will be severed from the rest of this Agreement and ignored. The invalidity, illegality or unenforceability of any provision Will not affect the validity, legality or enforceability of any other provision of this Agreement, which Will remain valid and binding.

No action or failure to act by the County Shall constitute a waiver of any right or duty afforded to the County under the Contract; nor shall any such action or failure to act by the County constitute an approval of, or acquiescence in, any breach hereunder, except as may be specifically stated by the County in writing.

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SECTION 5 - INSURANCE REQUIREMENTS

5-1 Evidence and Cancellation of Insurance

A. Prior to execution of the Contract, the Supply Contractor shall file with the County evidence of insurance and endorsements from the insurer(s) certifying to the coverage of all insurance required herein. All evidence of insurance must be certified by a properly authorized officer, agent, general agent or qualified representative of the insurer(s) and shall certify the name of the insured, the type and amount of insurance, the location and operations to which the insurance applies, the expiration date, and that King County received notice at least 45 Days prior to the effective date of any cancellation, lapse or material change in the policy.

B. The Supply Contractor shall, upon demand of King County, deliver to King County all such policy of insurance, and all endorsements and riders, and the receipts for payment of premiums thereon.

Failure to Provide such insurance in a time-frame acceptable to the King County shall enable King County to suspend or terminate the Supply Contractor's Work hereunder in accordance with Contract provisions regarding "Termination for Convenience/ Default/ Non-appropriation." Suspension or termination of this Contract shall not relieve the Supply Contractor from its insurance obligations hereunder.

5-2 Insurance Requirements

A. The Supply Contractor shall obtain and maintain the minimum insurance set forth below. By requiring such minimum insurance, the County shall not be deemed or construed to have assessed the risks that may be applicable to the Supply Contractor under this Contract. The Supply Contractor shall assess its own risks and, if it deems appropriate and/or prudent, maintain greater limits and/or broader coverage.

Nothing contained within these insurance requirements shall be deemed to limit the scope, application and/or limits of the coverage afforded, which coverage will apply to each insured to the full extent Provided by the terms and conditions of the policy(s). Nothing contained with this provision shall affect and/or alter the application of any other provision contained with this Contract.

For all coverages:

Each insurance policy shall be written on an “occurrence” form; excepting that insurance for professional liability, Errors and omissions when required, may be acceptable on a “claims made” form.

If coverage is approved and purchased on a “Claims made” basis, the contractor warrants continuation of coverage, either through policy renewals or the purchase of an extended discovery period, if such extended coverage is available, for not less than three (3) years from the date of completion of the Work which is the subject of this Contract.

B. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. General Liability

   Insurance Services Office form number (CG 00 01 Ed. 11-88) covering COMMERCIAL GENERAL LIABILITY.

2. Automobile Liability

   Insurance Service form number (CA 00 01 Ed. 12-90) covering BUSINESS AUTO COVERAGE, symbol 1 "any auto"; or the combination of symbols 2, 8 and 9.

3. Professional Liability

   Professional Liability, Errors and Omissions coverage.

   In the event that Services pursuant to this Contract either directly or indirectly involve or require professional Services, Professional Liability, Errors and Omissions coverage shall be Provided. "Professional Services," for the purpose of this Contract section shall mean any Services Provided by a licensed professional.

4. Workers' Compensation

   Workers' Compensation coverage, as required by the Industrial Insurance Act of the State of Washington, as well as any similar coverage required for this Work by applicable federal or "Other States" State Law.

5. Employers Liability or "Stop Gap":

   The protection Provided by the Workers Compensation Policy Part 2 (Employers Liability) or, in states with monopolistic state funds, the protection Provided by the "Stop Gap" endorsement to the General Liability policy.

C. Minimum Limits of Insurance

The Supply Contractor shall maintain limits no less than, for:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, Personal injury, and property damage, and for those policies with aggregate limits, a $2,000,000 aggregate limit.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

3. Professional Liability, Errors and Omissions: $1,000,000.

4. Workers' Compensation: Statutory requirements of the state of residency.

5. Employers Liability Stop Gap: $1,000,000.

D. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to, and approved by, the County. The deductible and/or self-insured retention of the policies shall not limit or apply to the Supply Contractor's liability to the County and shall be the sole responsibility of the Supply Contractor.

E. Other Insurance Provisions

The insurance policies required in this Contract are to contain, or be endorsed to contain the following provisions:

1. General Liability Policy:

Use this exact text on the Insurance Form in Box 'Other"

a. The County, its officers, officials, employees and agents are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor with this Contract.

b. To the extent of the Supply Contractor's negligence, the Supply Contractor's insurance coverage shall be primary insurance as respects the County, its officers, officials, employees and agents. Any insurance and/or self-insurance maintained by the County, its officers, officials, employees or agents shall not contribute with the insurance or benefit the contractor in any way.

c. The Supply Contractor's insurance shall apply separately to each insured against whom a claim is made and/or lawsuit is brought, except with respect to the limits of the insurer's liability.

F. Acceptability of Insurers

Unless otherwise approved by the County:

Insurance is to be placed with insurers with a Bests' rating of no less than A:VIII, or, if not rated with Bests', with minimum surpluses the equivalent of Bests' surplus size VIII.

If at any time one of the foregoing policies shall be or become unsatisfactory to the County, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the County, the Supply Contractor shall, upon notice to that effect from the County, promptly obtain a new policy, and shall submit the same to the County, with the appropriate certificates and endorsements, for approval.

G. Subcontractors

The Supply Contractor shall include all Subcontractors as insureds under its policies, or shall furnish separate certificates of insurance and policy endorsements for each Subcontractor. Insurance coverages provided by Subcontractors as evidence of compliance with the insurance requirements of this Contract shall be subject to all of the requirements stated herein.

H. Work Site Safety

The Supply Contractor shall have the “right to control” and bear the sole responsibility for the job site conditions, and job site safety. The Supply Contractor shall comply with all applicable Federal, State and Local safety regulations governing the job site, employees and Subcontractors. The Supply Contractor shall be responsible for the Subcontractor’s compliance with these provisions.

J. Endorsements

Endorsement must be included with insurance. Examples of forms are 2010 11 85 or CG 76 80 10 00.

5-3 Property Insurance

A. The Supply Contractor shall purchase and maintain property and Cargo insurance upon all materials and equipment supplied under this contract while at the Contractor's facility, offsite while in transit or at a storage site until delivery to the installation site to the full replacement value thereof and for removal of damaged property. Such insurance shall include coverage for indirect property loss including "extra expense" and “loss of use”. The insurance shall include the interests of the County as a named insured and loss payee, the Supply Contractor, and subcontractors as their interests may appear and shall insure against physical loss or damage by perils included under an "All Risk" policy form, including Earthquake and Flood as well as perils standard to Cargo coverage

Evidence of such coverage shall be provided to the County by certificate of insurance and applicable endorsements at the point in which the equipment has been identified as a deliverable under this Supply contract. We will accept evidence of inventory coverage at contract signing and require evidence of storage and cargo insurance upon the initiation of the delivery request from the County.

B. Selection of the deductible amount shall be at the option of the Supply Contractor. Any uninsured loss resulting from any such deductible shall be borne by the Supply Contractor. The County shall be advised of any such deductible.

C. The County assumes no obligation to provide insurance or to assume responsibility for damages, costs, and expenses to the Supply Contractor and its subcontractors.

D. Any loss insured under the above-referenced policies shall be adjusted with the Supply Contractor and payments made to the Supply Contractor as trustee for the insureds, as their interests may appear, subject to the requirements of the loss payee clause on behalf of the County. Such payments under the loss payee clause shall be paid directly to the County or at the option of the County, to the Contractor for the purpose of replacement of the property.

E. The Contractor waives all rights against the County for damages caused by fire or other perils. The foregoing waiver shall not extend to any other obligation or liability of either the County or the Contractor covered elsewhere in this Agreement, including those provisions relating to indemnification of the County by the Contractor.

F. Section 5-2 F shall apply to this subsection.

SECTION 6 – PROPOSAL QUESTIONS

6-1 General

A. This section contains the questions required to be addressed by Proposers. Proposals shall address the questions in the order presented identifying the proposal questions by number. Proposals need to be specific, detailed and straightforward using clear, concise, easily understood language.

B. Proposers answering the proposal questions shall examine the entire Request for Proposal document including the instructions, terms and conditions, Specifications and applicable standards and regulations. Failure to do so shall be at the Proposers risk.

C. The County desires a power generation system that operates reliably and efficiently on digester gas and natural gas. It is important to be able to generate power as efficiently as possible in order to reduce West Point plant electrical costs. If the County is successful in obtaining a natural gas supply to the plant, it will be advantageous to the County to have a power generation system that can mix fuels and maximize power output. County staff is interested in using the power generation system as a standby power system if utility power at the plant is lost for an extended period. At the same time, the community and the staff are very concerned that low noise levels be maintained as well as low air emissions. These are all goals of this project.

D. Section 2-6, Evaluation Process, sets forth the weighted maximum scoring points system that will be used for evaluating the proposals. Along with other proposal contents indicated in Section 1-17 A, the Proposer's responses to this Section 6 are intended to provide the reviewers with the information needed to judge the worthiness of each proposal. The proposal evaluation team will assign points to each proposal section based on the guidelines of Section 2 and the information provided in this Section 6.

6-2 Contacts

Provide separate contacts for dealer representative and manufacturer where applicable

A. Provide names, addresses, telephone numbers, and hours available for local sales and service representatives of the Proposing entity.

B. Provide names, addresses, telephone numbers, and hours available for factory sales and service representatives for each piece of major equipment, including engine-generators, radiators, heat exchangers, heat recovery silencers, supplementary silencers, auxiliary pumps, motors, and isolation valves

C. Provide names, addresses, telephone numbers for after-hours contacts for emergency parts repair and replacement.

6-3 References

A. Provide four (4) recent references of projects of similar size and quantity performed by the Proposer. For these recent projects, the installation must have been completed within the last five (5) years and the engines must have been in operation for at least six (6) consecutive months. At least one project shall include an engine-generator of the same model as proposed operating on digester gas in the 2-3 MW range. The remaining three (3) projects must be of similar size, i.e. each engine must be in the 2-3 MW range, but may be operating on other gaseous fuels, including landfill gas. Preference will be given to Proposers with extensive references for digester and landfill gas applications.

   Provide the following information for each project:
   - *Owner:*
   - *Location:*
   - *Contact Name, phone number, e-mail address:*
   - *Date of Installation:*
   - *Number, type and model number of engines*
   - *Rated continuous power of each engine-generator*
   - *Operating gas and any supplemental gas type*
   - *Gas conditioning provided*
   - *Installation Contractor*
   - *Number of on-site personnel trained*
   - *Project manager*
   - *General description/quantity of products provided*
   - *Required emission levels*
   - *Names of any subcontractors that are also proposed to perform work under this RFP*

B. Provide two (2) references of past projects of similar size and quantity performed by the Proposer. For these past projects, the installation must have been completed more than five (5) years ago and the engines must have been in operation for at least six (6) consecutive months. These projects do not have to be associated with the current Proposer, but the projects shall include an engine-generator of the manufacturer of the proposed engine-generator for the West Point Power Generation Project. However, these engine-generators do not have to be the same engine model as the engine proposed for the West Point Power Generation Project, if the proposed engine-generator was not available at the time of purchase for the past projects. These older references must be operating on digester gas or landfill gas and are separate from the recent references.

   Provide the following information for each project:
   - *Owner:*
   - *Location:*
   - *Contact Name, phone number:*
   - *Date of Installation:*
   - *Number, type and model number of engines*
   - *Rated continuous power of each engine-generator*
   - *Operating gas and any supplemental gas type*
   - *Gas conditioning provided*
   - *Installation Contractor*
   - *Number of On Site personnel trained*
   - *Project manager*
   - *General description/quantity of products provided*

- *Required emission levels*

D. Provide two (2) recent references of projects of similar size and quantity performed by the Instrumentation and Controls subcontractor if such work is subcontracted or include similar reference information supporting this type of experience if being done directly by the Proposer. These projects may be the same as those referenced above if they include descriptions of work that meets the criteria called for here. For these recent projects, the installation must have been completed within the last five (5) years and the power generation system must have been in operation for at least six (6) consecutive months. At least one project shall include a control system utilizing similar controllers to those being proposed here with a similar level of control integration and system complexity as that being specified here. The other project should include controls of similar scope and complexity but need not be with the same or similar controllers. Preference will be given to Proposers with extensive references for controls integrating County preferred controllers with power generation controls.

Provide the following information for each project:
- *Owner:*
- *Location:*
- *Contact Name, phone number:*
- *Date of Installation:*
- *Description of prime mover system*
- *Installation Contractor*
- *Project manager*
- *General description/quantity of products provided*
- *Description of controls and control integration provided*

6-4 Manufacturer, and Proposer Information

A. PROPOSER INFORMATION

1. Proposers must provide proof that they are the certified engine-generator manufacturer or authorized representative of the engine-generator manufacturer.

2. Provide the names, addresses, telephone numbers and qualifications of any business entities to whom the supply of the following primary components of the package will be subcontracted:

   - Heat Recovery Equipment
   - Switchgear
   - Instrumentation and Control System
   - Panels

3. Provide the name and qualifications of the Proposer's Project Manager the Quality Assurance Manager, and the Instrumentation and Controls Startup Engineer who will be assigned to this project.

4. Provide detailed experiences applying internal combustion engines using digester gas as the primary fuel source with the proposed engine manufacturer.

5. Provide detailed experiences with internal combustion engines using landfill gas as the primary fuel source with the proposed engine manufacturer.

6. Provide detailed experience with integrating power monitoring and control equipment and switchgear with engine-generators for Proposer, proposed Project Manager and the Instrumentation and Controls Startup Engineer and any subcontractors to whom the integration work will be subcontracted.

B. MANUFACTURER INFORMATION FOR:
- **Engine,**
- **Generator,**
- **Heat Recovery Equipment,**
- **Panels, and**
- **Switchgear**

1. Provide information on factory and manufacturing facilities, locations, and manufacturing schedules. Describe preferred means for shipping and delivery of the engine-generator system.

2. Describe manufacturing processes quality control/ quality assurance procedures.

3. Provide approximate lead times for the delivery of a complete set of two engine-generator systems meeting the requirements of this RFP.

4. List any charges associated for accelerated schedules.

5. Describe the Factory's ability to customize standard components.

   a. Give examples of customization that is readily available.
   b. Describe how the customization surcharge would be calculated?

6. Describe information on available training for maintenance personnel by Factory Representatives in the field or at the factory, along with associated costs and options?

7. Describe extended Warranties or Maintenance agreements that are available after the Warranty period.

8. Provide a list of major components produced by manufacturer, such as engine, alternators, fuel systems and controls.

9. List the equipment design life for major components.

10. Provide information demonstrating the ability of the manufacturer to complete repairs.

6-5 Compliance With Technical Specifications

It is important that each proposer pay careful attention to Section 7 (with Addenda updates). Section 7 outlines the basic system to be supplied by the Supply Contractor. Your Proposal should be complete and respond to all aspects of Section 7. Any exceptions shall be explained on separate sheet attached to your Proposal, referencing the RFP section and subsection and paragraph.

A. GENERAL:

The following general information in response to this request for proposals shall be submitted:

1. Description and scope of supply for the equipment proposed.

2. A Certificate of Unit Responsibility as specified under in Section 7 paragraph 11093-1.04 D.

3. Wet weight of complete unit and of heaviest single component.

4. Description and catalog data of foundation, mounting and isolation requirements, and vibration isolation system.

5. Catalog data for all major components

6. Identify any specialty tools required

B. ENGINE:

The following engine information shall be submitted:

1. Manufacturer's engine make, model number, size, rating, and descriptive information.

2. Torque, brake horsepower, and fuel consumption curves for the specified conditions.

3. Complete fuel piping schematics showing the relative position of all filters, valving, and appurtenances and including fuel regulation.

4. Lube oil piping schematics showing the relative positions of all valving, pumps, filters, temperature and pressure detectors.

5. Cooling water piping schematics, showing the relative position of all pumps, temperature and level detectors, heat exchangers and safety devices, and the rate of flow in all cooling water circuits.

6. Details of all safety devices and pressure, temperature, and level switches.

7. Sound power pressure level information, by octave band, for the engine-generator system at 50 feet and 90 degrees from centerline of the stack.

8. Exhaust gas flow rate, in acfm, and temperature at rated condition, 75 percent, and 50 percent power.

9. Catalog data for all major components

C. GENERATOR:

The following generator information shall be submitted:

1. Weight.

2. Stator and field ratings including temperature rise at full load and overload conditions.

3. Complete description of insulation system.

4. Catalog data for all major components.

D. ENGINE GENERATOR CONTROLS AND POWER DISTRIBUTION:

The following control information shall be submitted:

1. A functional description and block diagram for the generator engine control, master control, power distribution, voltage regulation and excitation circuitry showing identified terminals and identified conductors.

2. Complete step-by-step functional descriptions of the operation of each control circuit.

3. Descriptive information in sufficient detail to verify the specified requirement of this Section for the following:

   a. Control power supplies including charger and batteries.

   b. Loading controls including load controllers and load sensors

   c. Governing system, including actuator, and speed controls.

   d. Synchronizing controls including automatic and manual synchronizing controls.

   e. Excitation controls including exciter, voltage regulator and VAr/pf controls.

E. CAPACITIES AND PERFORMANCE:

1. Show the operating and performance conditions for each engine-generator that will be provided below. Fill out the table and add any supporting information necessary to explain the entries unless they are explained elsewhere in the submitted information. Additions to the table are encouraged as required to present a complete system.

   Note: Unless otherwise specified, values are at 100 percent load.

No.	Item	Proposer's Response
ENGINE GENERATOR		
1	**Engine-Generator Model**	
POWER OUTPUT AND ENGINE DATA		
2	Maximum continuous out-put (rating) on digester gas, kW	
3	Maximum continuous out-put (rating) on natural gas, kW	
4	Operational minimum load, percent of rating	
5	Percent available time reasonably achievable	
6	Size, L x W x H, inches	
7	Weight, lbs	
8	Compression ratio	
9	Engine brake mean effective pressure, psig	
10	Engine rotational speed, rpm	
11	Engine piston speed, ft. /min	
12	Engine cylinder displacement, cubic inches	
13	Allowable engine exhaust backpressure, maximum psi	
14	Guaranteed maximum time required to switch from 100 percent sewage digester gas fuel to 50 percent natural gas fuel, minutes	
EFFICIENCY Guaranteed efficiency, as defined in Section 7, 11093-1.06 B., on natural gas at the following loads.		
15	At full rated load, Btu/bhp-hr	
16	At 75% of full rated load, Btu/bhp-hr	
17	At 50% of full rated load, Btu/bhp-hr	

No.	Item	Proposer's Response
EMISSIONS Guaranteed emissions as defined in Section 7, 11093-1.06 C {Correction Factor = (20.9 - Reference %O_2) / (20.9 - Exhaust %O_2)}		
18	For emissions, use Attachment 6-8-1 of this RFP	
LUBE OIL HEAT RECOVERY		
19	Oil heat rejection per engine at 100% load, Btu/hr	
20	Type of lube oil to water heat exchanger, shell and tube, plate and frame, etc.	
21	Type of heat exchanger and heat exchange fluid (oil or water) transferring in the heat exchanger to heat loop water. (shell and tube, plate and frame, etc.)	
22	Heat exchanger rated capacity, Btu/hr	
23	Engine side oil or water flow rate, gpm	
24	Heat loop water flow rate required, gpm	
25	Heat loop water entering temperature, ^{0}F (170 ^{o}F available)	
26	Heat loop water leaving temperature, ^{0}F	
27	Maximum lube oil cooler water inlet temperature, ^{o}F	
28	Heat loop flow pressure drop across oil cooler exchanger, psi.	
29	Oil pump drive type (electric motor driven or engine auxiliary shaft driven)	
JACKET WATER HEAT RECOVERY		
30	Heat rejection from engine to jacket water, Btu/hr	
31	Jacket water heat exchanger type	
32	Rated capacity, Btu/hr	
33	Engine side flow rate, gpm (30% ethylene glycol)	
34	Heat loop flow rate required, gpm	
35	Heat loop entering	

No.	Item	Proposer's Response
	temperature, ^{o}F (170 ^{0}F available)	
36	Heat loop leaving temperature, ^{o}F	
37	Minimum jacket water exit temperature, ^{o}F	
38	Heat loop flow pressure drop across jacket water exchanger, psi	
39	Jacket water pump drive type (electric motor driven or engine auxiliary shaft driven)	
EXHAUST		
40	Heat rejection from exhaust, Btu/hr	
41	Heat recovery silencer rated capacity, Btu/hr	
42	Exhaust gas flow rate at rated load, scfm and acfm	
43	Type of heat recovery silencer	
44	Exhaust gas entering temperature at full load, ^{0}F	
45	Exhaust gas leaving temperature at full load, ^{0}F	
46	Exhaust gas leaving temperature at 50 percent load, ^{0}F	
47	Heat recovery fluid. (Jacket water or heat loop?)	
48	Heat recovery fluid flow rate, gpm	
49	Heat recovery fluid entering temperature, ^{0}F	
50	Heat recovery fluid leaving temperature, ^{0}F	
51	Heat recovery fluid flow pressure drop, psi	
INTERCOOLER / AFTERCOOLER		
52	Heat rejection, Btu/hr	
53	Heat recovery rated capacity, Btu/hr	
54	Heat recovery loop flow rate (30% ethylene glycol), gpm	
55	Heat recovery loop entering	

No.	Item	Proposer's Response
	temperature, maximum ^{0}F	
56	Heat recovery loop leaving temperature, ^{0}F	
57	Heat recovery loop flow pressure drop, psi	
58	Intercooler heat recovery loop water pump drive type (electric motor driven or engine auxiliary shaft driven)	
FUEL OIL COOLER (if needed)		
59	Heat rejection, Btu/hr	
60	Rated capacity, Btu/hr	
61	Cooling loop flow rate (30% ethylene glycol), gpm	
62	Cooling loop entering temperature required, maximum ^{0}F	
63	Cooling loop leaving temperature, ^{0}F	
64	Cooling loop flow pressure drop, psi	
65	Cooling loop water pump drive type (electric motor driven or engine auxiliary shaft driven)	
66	Fuel oil cooler water pump drive type (electric motor driven or engine auxiliary shaft driven)	
INJECTION NOZZLE COOLER (if needed)		
67	Heat rejection, Btu/hr	
68	Rated capacity, Btu/hr	
69	Cooling loop flow rate (30% ethylene glycol), gpm	
70	Cooling loop entering temperature, maximum ^{0}F	
71	Cooling loop leaving temperature, ^{0}F	
72	Cooling loop flow pressure drop, psi	
73	Cooling loop water pump drive type (electric motor driven or engine auxiliary shaft driven)	
74	Fuel oil cooler water pump	

No.	Item	Proposer's Response
	drive type (electric motor driven or engine auxiliary shaft driven)	
GENERATOR		
75	Generator type	
76	Generator rotational speed, rpm	
77	Generator efficiency, percent at 100 percent load, 1.0 PF	
78	Generator efficiency, percent at 75 percent load, 1.0 PF	
79	Generator efficiency, percent at 50 percent load, 1.0 PF	
80	Generator efficiency, percent at 100 percent load, 0.8 PF	
81	Generator efficiency, percent at 75 percent load, 0.8 PF	
82	Generator efficiency, percent at 50 percent load, 0.8 PF	
83	Generator temperature rise in 50° C ambient condition	
84	Generator insulation class	
85	Generator power factor	
CONTROL SYSTEM		
86	Control system voltage	
87	Control system batteries, number	
88	Control system battery size, amp-hours	
FUEL SYSTEM		
89	Digester gas fuel pressure required ahead of supplied gas equipment, minimum psig	
90	Natural gas fuel pressure required ahead of supplied gas equipment.	
91	Fuel consumption each engine, maximum MMBtu/hr	
92	Fuel gas filtration required, particulate size, microns	
93	Siloxane removal required, maximum mg/cubic meter	

6-6 Additional Technical and Performance Criteria

The following table lists additional evaluation criteria, which are critical to the success of a power generation project for King County. The Proposers will be rated based on the completeness and quality of answers to the following criteria items as well as the relative comparison of criteria responses from other Proposers. The Proposer's response as to the untreated emissions data shall include a source of the emission value, such as factory tests, as well as actual emissions and emissions corrected to 15 percent oxygen $ppmv_d$.

Non Economic Criteria	Proposer's Response
Untreated Emissions	Form 6-8. 1
Emissions and Fuel/Air Control System	Form 6-8. 2
Parts Availability	Form 6-8. 3
Digester Gas Experience	Form 6-8. 4
Engine-Generator System Space Requirements	Form 6-8. 5
Noise Criteria	Form 6-8. 6
Other Beneficial Features	Form 6-8. 7

Use attachment forms in Section 6-8

6-7 Life Cycle Cost Analysis

A. Proposers are to provide additional data that will be used to develop life-cycle-cost estimates for each Proposer's system. The following table lists the components that will be considered in the life-cycle-cost analysis. In addition, the information provided in Sections 6-5 and 6-6 will be considered, and in particular, the guaranteed efficiency provided under paragraph 6-5 E.1. Proposers are to return the Forms completed, if additional information is submitted attach that information to the appropriate Form.

Criteria	Proposers Response
Project Costs (U.S. dollars)	Form 6-8. 8
Fuel Gas Pressure and Flow Rates	Form 6-8. 9
Level of Gas Clean Up Required (allowable levels of contaminants in fuel gas)	Form 6-8.10
Mechanical Maintenance Items	Form 6-8.11
Electrical Maintenance Items	Form 6-8.12
Operating Costs	Form 6-8.13
Recommended Alternatives and Costs	Form 6-8.14
Other Beneficial Features	Form 6-8.15

Use attachment forms in Section 6-8

B. The life-cycle-costs will take into consideration the expected gas flow variations in the plant, expected power revenue, and other variables. These along with the capital cost, maintenance costs, and operation costs will make up the life-cycle-cost. Items from Recommended Alternatives and Beneficial Features may be used in developing the life-cycle-costs for a system.

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FORM 6-8.1 Guaranteed Untreated Emissions

Refer to Section 7, 11093, 1.06 B

Fuel Source: **Digester Gas**	ppmv$_d$ (% O_2 =____)			ppmv$_d$ (corrected)[1]			g/bhp-hr			Emission value source
Load	50%	75%	100%	50%	75%	100%	50%	75%	100%	-
NOx										
CO										
NMHC										
Particulate matter										

[1] Emissions corrected to 15 percent O_2.

Fuel Source: **Natural Gas**	ppmv$_d$ (% O_2 =____)			ppmv$_d$ (corrected)[1]			g/bhp-hr			Emission value source
Load	50%	75%	100%	50%	75%	100%	50%	75%	100%	-
NOx										
CO										
NMHC										
Particulate matter										

Repeat table for Digester/Natural gas blends of 75 percent/25 percent and 50-50 percent on a volume flow rate (scfm) basis.

If other fuel sources can be used, include the fuel and its emissions information below

Fuel Source: _____	ppmv$_d$ (% O_2 =____)			ppmv$_d$ (corrected)[1]			g/bhp-hr			Emission value source
Load	50%	75%	100%	50%	75%	100%	50%	75%	100%	-
NOx										
CO										
NMHC										
Particulate matter										

Repeat table for any additional fuel source (diesel, propane, etc)

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FORM 6-8.2 Emissions and Fuel/Air Control System

1. Describe how emissions requirements are to be met, including which parameters are measured and which are controlled

2. Describe how the fuel/air ratio is controlled, including which parameters are measured and which are controlled

3. Describe any software and hardware used in 1 and 2 above

This Page Blank

FORM 6-8.3 Parts Availability

Provide the following information for the engine, generator, heat recovery equipment, instrumentation and control systems and switchgear.

1. Provide a list of recommended spare parts.

2. Provide list of parts warehoused locally, quantity, availability, and means of contact other than the local sales representative or sales office.

3. List separately the parts that will not be stocked locally, where they will be stocked how long it will normally take to delivery the parts to the King County West Point plant. Provide information to demonstrate that parts can be made available to West Point within 24 hours.

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FORM 6-8.4 Digester Gas Experience

1. List a maximum of ten (10) past projects with internal combustion engines using digester gas as the main fuel source. List the projects by engine model and list the same engines as proposed for the West Point Power Generation Project first. Include contact information for all projects.

Model	Rated bhp	Installation date	Company, location, Contact	Operating hrs on (100% digester gas)	Avg digester gas composition	Supplemental fuel(s) available	Operating hrs on supplemental fuel(s)

2. Briefly describe each project including type and size of engine-generator. Include operational challenges and difficulties, siloxane issues, digestion process, gas pressure available, scfm gas available, supplemental fuels, emission requirements, cogen/power generation, digester gas composition. Use attachments if necessary

This Page Blank

FORM 6-8.5 Engine-Generator System Space Requirements

1. Preliminary outline drawings (plans and sections) for the complete engine-generator set, exhaust system, control cabinets, switchgear, heat recovery system, and oil system.

2. Preliminary exhaust system component sizes and weights.

3. Description, schematic diagram, dimensions and weights of the lube oil system components including heat recovery systems and oil filtration systems.

4. Description, schematic diagram, dimensions and weights of the engine cooling/heat recovery system including the heat loop heat exchanger, jacket water circulation pumps, other circulation pumps, and other system components. Dimensions of the waste heat radiators and room for maintenance are also important.

5. Description, schematic diagram, dimensions and weights of the air starting system including air motors, compressors, air receivers, valves, and controls.

6. Description, schematic diagram, dimensions and weights of intercooler/aftercooler system including filters, regulators, control valves, interlocks, heat loop heat exchanger, water circulations pumps.

7. Recommended maintenance space requirements

8. Minimum distance required to other objects/walls/ceilings, etc.

9. Required elevation above grade level or surrounding surfaces.

10. Dimensions and clearances for any other equipment items so that space allocations can be confirmed.

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FORM 6-8.6 Noise Criteria

1 Generator Exhaust

Sound emanating from the generator exhaust stack, as measured radially 50 feet from the exhaust flange center line at 90 degrees from the direction of flow, shall not exceed the following sound pressure levels:

Octave Band Center Frequency, Hz	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Sound Pressure Levels, dB (re:20 μPA)	**70**	**60**	**52**	**46**	**43**	**42**	**42**	**44**

Provide a similar table showing the guaranteed maximum sound pressure level at the same conditions for the proposed engine-generator and exhaust silencing system.

2 Remote Radiators

Sound emanating from the remote radiators shall not exceed the following sound pressure levels at 25 feet:

Octave Band Center Frequency, Hz.	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Sound Pressure Levels, dB (re:20 μPA)	**84**	**74**	**66**	**60**	**57**	**56**	**56**	**58**

Provide a similar table showing the guaranteed maximum sound pressure levels at the same conditions for the proposed waste heat remote radiators. Provide the data for each radiator.

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FORM 6-8.7 Other Beneficial Features (non-economic)
(Optional)

1. Describe any additional features of your proposed system that would provide non-economic benefits to the County.

2. List each feature and its benefit to the County separately.

3. For each feature noted in item 2 above, list any equipment that would be required to take advantage of the feature that is not included in the Proposer's price indicated on Form 6-8.8.

Note: Detail in Form 6-8.15 any Beneficial Features that have an Economic benefit

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FORM 6-8.8 Project PRICING

Provide the cost of equipment and services as specified for all Work in this Contract. Note that the minimum detail of pricing is indicated and that values must appear in each line item, except line X and those for alternate PLCs.

Item	Qty	Equipment description	Unit Price	Total cost (US$)
A	2	Engine-Generator		
B		Heat wasting equipment (including radiators)		
C		Exhaust System		
D		Heat Recovery Silencer		
E		Jacket Water Heat Recovery System		
F		Lube Oil System and Heat Recovery		
G		Intercooler/Aftercooler Systems with Heat Recovery		
H		Starting Air System		
I		Fuel Gas Systems		
J		Fuel Gas Blending System		
K		Fuel Oil Systems		
L		Engine-generator control panels		
M		Engine-generator PLCs and digital controllers (note 1)		
		Specified Allen Bradley or Siemens PLCs		
		Alternative PLCs proposed (optional)		
N		Engine-generator human/machine interfaces		
O		Electrical switchgear panels		
P		Instrumentation		
Q		Synchronization		
R		Protective relaying		

Item	Qty	Equipment description	Unit Price	Total cost (US$)
S		Load sharing and speed controls		
T		Spare parts		
U		Factory Testing		
V		Delivery to Job Site		
W	99	Days of On-Site Field Services (Training, Installation, Testing, Commissioning etc. as specified in Section 7.)		
X		Other not included elsewhere (must be itemized)		
TOTAL COST FOR ALL WORK UNDER THIS CONTRACT, Specified PLCs				
TOTAL COST FOR ALL WORK UNDER THIS CONTRACT, Alternate PLCs, Optional				

[1]King County has Allen Bradley and Siemens PLCs in the plant and prefers that new installations use these brands. Contracts are in place for their purchase at pre-negotiated prices, see Section 7 11093. Proposer is invited to propose an alternate if cost reduction is available.

FORM 6-8.9 Fuel Gas Mixing, Pressure, and Flow Rates

1. List all fuel gas pressures and flow rates required at 50 percent, 75 percent, and full load for digester gas and natural gas.

2. List all liquid fuel pressures and flow rates required.

3. Describe the systems provided for mixing of digester and natural gas. Include first cost of all equipment and valves. Include first cost in Form 6-8.8 and maintenance information in Forms 6-8.11 and 6-8.12.

4. If other fuels can be used in the engine, include similar information to above.

5. If fuel gas mixing is not presently offered for the proposed engine-generator, please list the requirements of a fuel mixing system if designed by the engineer and installed by the installation contractor. Mixing of natural gas and digester gas in any proportions is highly desirable.

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FORM 6-8.10 Level of Gas Clean-up Required

1. Provide maximum allowable engine inlet concentrations of fuel gas contaminants, such as siloxane (mg/m3), H2S (ppm), oil vapor (lb/hr). Add others if necessary.

2. Indicate required temperature and moisture content (percent saturation) of fuel gas at engine inlet.

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FORM 6-8.11 Mechanical Maintenance Items

Provide the following detailed mechanical maintenance information for up to 175,000 operating hours. Include all items that need replacement or service during the specified operating hours. .

1. List all Preventative Maintenance items and associated costs

2. Present more frequent major repair and

3. Provide your estimated Mean Time Between Failures for major equipment.

Note: Vendor's standard maintenance cost estimating forms may be substituted if they contain the same level or more detailed information. Use attachment if necessary. Favorable consideration will be given to proposers whose estimates of maintenance costs are confirmed by references provided under Section 6-3.

Service interval (hrs)	**Part number**	**Part/service description**	**QTY**	**Unit cost (US$)**	**Service, repair, and/or replacement time** (King County plant staff personnel)

These unit costs should be the basis for Spare Parts pricing on Form 6-8.14.

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FORM 6-8.12 Electrical Maintenance Items

Provide the following detailed mechanical maintenance information for up to 175,000 operating hours. Include all items that need replacement or service during the specified operating hours. .

1. List all Preventative Maintenance items and associated costs

2. Present more frequent major repair and

3. Provide your estimated Mean Time Between Failures for major equipment.

Note: Vendor's standard maintenance cost estimating forms may be substituted if they contain the same level or more detailed information. Use attachment if necessary. Favorable consideration will be given to proposers whose estimates of maintenance costs are confirmed by references provided under Section 6-3.

Service interval (hrs)	**Part number**	**Part/service description**	**QTY**	**Unit cost ($)**	**Service, repair, and/or replacement time** (King County plant staff personnel)

These unit costs should be the basis for Spare Parts pricing on Form 6-8.14.

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FORM 6-8.13 Operating Costs

King County Staff Operational Hours

List all activities and number of King County plant staff personnel hours **per month** to complete and carry out all operations, including monitoring, oil sampling, etc.

Note: Don't include amounts already included on Forms 6-8.11 and 6-8.12

Favorable consideration will be given to proposers whose estimates of operating costs are confirmed by references provided under Section 6-3.

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FORM 6-8.14 OPTIONS

Additional Cost Information and Recommended Alternatives and Costs

If for some reason the site is not ready to accept the equipment for delivery, it may be necessary to store the equipment. Provide the costs associated with storage.

Provide the County with prices for a possible third engine-generator and for spare parts in the future with price escalation.

Provide a description and a cost breakdown of any recommended alternative equipment the Proposer wished to offer.

Provide your recommendations and costs in the tables below. Add sheets as necessary.

OPTION Storage of Equipment				
	EST QTY	**Work Description**	**Unit Price**	**Total cost (US$)**
1	3	Cost per month for equipment storage.		

OPTION Third Engine Package			
2	1	Engine-generator set with heat recovery, controls, and switchgear. Include a scope of supply, fiscal year September 2003 to September 2004.	
		See Section 1-1 F.	**Maximum % Increase in Price**
	A	Fiscal year September 2004 to September 2005	
	B	Fiscal year September 2005 to September 2006	
	C	Fiscal year September 2006 to September 2007	
	D	Fiscal year September 2007 to September 2008	
	E	Fiscal year September 2008 to September 2009	

OPTION Spare Parts			
3	Spare parts for maintenance and overhaul of the engine-generator system Present the Spare Parts on an separate list attached.		
	A	Fiscal year September 2003 to September 2004	Prices from Forms 6-8.11 and 6-8.12.
			% Increase in Price above Spare Parts listed in 3A.
	B	Fiscal year September 2004 to September 2005	
	C	Fiscal year September 2005 to September 2006	
	D	Fiscal year September 2006 to September 2007	
	E	Fiscal year September 2007 to September 2008	
	F	Fiscal year September 2008 to September 2009	

OPTION Proposer Recommended alternative equipment		
4	Items such as gas compression systems and siloxane removal equipment could be offered as recommended alternatives for example. Provide separate list of equipment and services included, to include all necessary controls, starters, instrumentation, field services and auxiliary equipment. Fiscal year September 2003 to September 2004.	
	List all items	Price (in US dollars)

FORM 6-8.15 Other Beneficial Features (economic)
(Optional)

1. Describe any additional features of your proposed system that would provide **economic benefits** to the County.

2. For each feature noted in item 1 above, provide submittal information for any additional equipment that would be required to take advantage of that feature:

   - the dimensions of the equipment,
   - concepts of operation,
   - control requirements,
   - layout information, and
   - cost of such equipment in addition to the costs indicated on Form 6-8.8.

3. For each additional feature with potential economic benefits, provide information on:

   - Estimated savings or revenue attributable to the feature.

   Example calculations may be appropriate.

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King County

ATTACHMENT A

PROPOSAL RESPONSE FORM

RFP NO: 03-013-PR

Proposer's Declarations and Statement of Understanding

The undersigned (hereinafter called the "Proposer") declares that he/she has read the RFP and has authority to submit the following Proposal. The Proposer understands that, in addition to this Proposal Response Form, the RFP and Proposer's supporting documents constitute parts of the Proposal and are incorporated herein by reference. Proposer acknowledges that **Addenda numbers _____ through _____** have been delivered and have been taken into account as part of this Proposal, and that all Addenda issued are hereby made part of our Proposal.

Proposer hereby designates _____, Telephone No:_____ as the Person to contact for additional information about our Proposal.

E-Mail Address: _____ Fax No: _____

DECLARATION

By signing this Proposal, I hereby declare, under penalty of perjury under the laws of the United States that the following statements are true and correct:

1. The undersigned Person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this Proposal is submitted.
2. By signing the signature page of this Proposal, the undersigned business organization is deemed to have signed and agreed to the provisions of this declaration, and authorized the signature below.
3. In preparing this Proposal, the Proposer has not been assisted by any current or former employee of the County whose duties relate now or have related in the past to this Proposal or prospective agreement, and who was assisting in other than his or her official public capacity. Neither does such a Person nor any member of his or her immediate family have any financial interest in the outcome of this Proposal. Any exceptions to these assurances are described in full detail on a separate page and attached to this Proposal Response Form.

Internal Revenue Service (IRS) Reporting Requirements

Check one: ☐ Corporation; ☐ Partnership; ☐ Sole Proprietor; ☐ Other _____

Identify: State of Incorporation: _____

Provide one: Federal Tax Number _____ Social Security Number _____

Identify: UBI Number _____ Business License Number _____

What is the official name registered with the IRS for this number: _____

[ ] Proposer accepts all Contractual terms and conditions.

[ ] Proposer does not accept all contractual terms and conditions. Explanation must be included with proposal and may impact vendor selection.

Firm Name: _____

Address: _____

City, State, Zip: _____

Phone Number: _____

Authorized Signature: _____

Printed Name: _____

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King County

ATTACHMENT C

PERFORMANCE AND PAYMENT BOND
RFP NO. 03-013-PR

KNOW ALL BY THESE PRESENTS: That we, _____, as Principal, and _____ as Surety, are held and firmly bound unto King County in the full sum of _____ _____ Dollars ($_____), lawful money of the United States, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, The conditions of this obligation are such that the Principal has entered into a Contract in writing with King County for: _____ and the terms, conditions and covenants specified in said Contract, including all of the Contract documents, as amended and modified, therein referred to, are hereby referred to and made a part hereof as fully and completely as though set forth in detail herein;

NOW, THEREFORE, if the Principal shall faithfully perform all the provisions and requirements of the Contract, including all of the Contract documents, according to the terms and conditions thereof and shall hold the County harmless from any loss, or damage to any Person or property by reason of any negligence on the part of the Principal or of any Subcontractor in the performance of said Work, and shall pay all laborers, mechanics, Subcontractors and material men and all Persons who shall supply such Person or Subcontractors with provisions and supplies for carrying on of such Work, and shall pay the State of Washington all amounts due said State pursuant to Titles 50 and 51 of the Revised Code of Washington, and shall further indemnify and save harmless the County from any defect or defects in any of the workmanship or materials entering into any part of the Work as defined in the Contract which shall develop or be discovered within the time set forth in the Contract, then this obligation shall be null and void; otherwise to remain in full force and effect, and the County shall have the right to sue on this bond for any breach of the Contract or this bond.

IT IS FURTHER DECLARED AND AGREED that nothing of any kind or nature whatsoever that will not discharge the Principal shall operate as a discharge or a release of liability of the Surety, any law, rule of equity or usage relating to the liability of sureties to the contrary notwithstanding, and the Surety waives notice of any alteration, or extension of time, made by the County and agrees that it, the Surety, shall be bound in all ways to the County for any such alterations or extensions of time as if it had received notice of the same.

Signed and sealed this _____ Day of _____, 2003

Principal:_____	Surety: _____
By: _____	By: _____
Title: _____	Title: _____
Address: _____	Address: _____
City/Zip: _____	City/Zip: _____
Telephone: (____)_____	Telephone: (____)_____

Note: A power of attorney must be Provided which appoints the Surety's true and lawful attorney-in-fact to make, execute, seal and deliver this Performance and Payment Bond.

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King County

ATTACHMENT D
Personnel Inventory Report

Legal name of business_____ Telephone No: _____

dba (if applicable)_____

Street address_____City_____State_____Zip Code_____

Submitted by: _____ Title _____ Date _____

Do you have any employees?
No ___Yes___ IRS Employer Identification Number: _____

If yes, list on the Employment Data Chart below the total number of employees for all businesses located in (1) King County. If none, list the total number of employees for all businesses located in (2) Washington State. If none, list the total number of employees for all businesses located in the (3) United States. Indicate which locale (1,2,3) report covers_____. This report covers Business Location(s) in (circle one): [King County, Washington State, Other States] for the Payroll Period ending (Month/Day/Year): _____.
Do any of your employees belong to a union and/or do you use an employee referral agency? No _____Yes___If yes, list the unions and/or employee referral agencies with whom you have agreements: _____. If you expect to do more than $10,000 worth of public Work (construction) or, more than $25,000 worth of business with King County, the unions or employee referral agencies must submit a statement of compliance with King County Code Chapter 12.16.

Job Categories	Whites		African Americans		Asians		Native Americans		Hispanics		Disabled		Minority Subtotal		Disabled Subtotal	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Managerial																
Professional																
Technical																
Clerical																
Sales																
Service																
Labor																
On-Job Trainees																
Apprentice																
Skilled Craft*																
Subtotal																

* Journey worker: List by classification on reverse, e.g., carpenter, plumber, etc.

Total number of employees reported above: _____ If no employees, write "0."

King County

Personnel Inventory Report
SUPPLEMENTAL FORM
Use this form as necessary to report the total Work force.

Legal name of business_____Telephone_____

Submitted by: _____ Title _____ Date _____

Job Category	White		African American		Asian		Native American		Hispanic		Disabled		Minority Subtotal		Disabled Subtotal	
Managerial																
Professional																
Technical																
Clerical																
Sales																
Service																
Labor																
On-Job Trainees																
Apprentice																
Skilled Craft*																
Subtotal																

Contact the King County Procurement and Contract Services Section at (206) 684-1681 or the King County M/WBE and Contract Compliance Division (206) 684-1330 if you have any questions concerning completion of this form.

King County

ATTACHMENT E

Affidavit and Certificate of Compliance

with King County Code Chapter 12.16, Discrimination and Affirmative Action in Employment by Contractors, Subcontractors and Vendors

The undersigned, being first duly sworn, on oath states, s/he is authorized by the Supply Contractor, and on the Supply Contractor's behalf, affirms and certifies as follows:

Definitions: "Supply Contractor" shall mean any contractor, vendor or Supply Contractor who supplies Goods and/or Services. "Contract" shall mean any Contract, purchase order or agreement with King County Government, hereinafter called the County.

A. Supply Contractor recognizes that discrimination in employment is prohibited by federal, state and local laws. Supply Contractor recognizes that in addition to refraining from discrimination, affirmative action is required to Provide equal employment opportunity. Supply Contractor further recognizes that this Affidavit establishes minimum requirements for affirmative action and fair employment practices and implements the basic nondiscrimination provisions of the general Contract Specifications as applied to service, Supply Contractor, and vendor contracts exceeding $25,000, or public Work contracts exceeding $10,000. Supply Contractor herein agrees that this Affidavit is incorporated as an addendum to its general Contract, and recognizes that failure to comply with these requirements may constitute grounds for application of sanctions as set forth in the general Specifications, King County Code Chapter 12.16 ("Chapter") and this Affidavit. PROVIDED FURTHER, that in lieu of this Affidavit, the Executive may accept a statement pledging adherence to an existing contractor affirmative action plan where the provisions of the plan are found by the Executive to substantially fulfill the requirements of the Chapter.

B. Supply Contractor shall give notice to their supervisors and employees of the requirements for affirmative action to be undertaken prior to the commencement of Work.

C. This Person has been designated to represent the Supply Contractor and to be responsible for securing compliance with and for reporting on the affirmative actions taken:

D. Supply Contractor will cooperate fully the M/WBE and Contract Compliance Division and appropriate County agents while making every reasonable "good faith" effort to comply with the affirmative action and nondiscrimination requirements set forth in this Affidavit and in King County Code Chapter 12.16.

E. **Reports: The Supply Contractor agrees to complete and submit as required such additional reports and records that may be necessary to determine compliance with the Affidavit and to confer with the County Compliance Officer at such times as the County shall deem necessary. The information required by the Chapter includes but is not limited to the following reports and records:**

1. **Personnel Inventory Report:** This report shall include a breakdown of the employer workforce showing race, sex and handicapped and other minority data.

2. **Monthly Utilization Report:** This report shall apply to construction contractors and Subcontractors and shall Provide the number of hours of employment for all employees, including minority, women and disabled employees by craft and category.

3. **Statement from Union or Worker Referral Agency:** This statement affirms that the signee's organization has no practices and policies which discriminate on the basis of race, color, creed, religion, sex, age, marital status, sexual orientation, nationality or the presence of sensory, mental or physical disability.

The information required in this section shall be submitted on forms Provided by the County unless otherwise specified.

F. **Subcontractors:** For public works projects and contracts of ten thousand dollars ($10,000) or more, and for all other contracts and agreements of twenty-five thousand dollars ($25,000) or more, the prime contractor shall be required to submit to the County, along with its qualifying documents under the Chapter, employment profiles, Affidavits and Certificates of Compliance, Reports and Union Statements from its Subcontractors in the same manner as these are required of the prime contractor. Reporting requirements of the prime contractor during the Contract period will apply equally to all Subcontractors.

G. **Employment Goals for Minorities, Women and Persons with Disabilities:** No specific levels of utilization of minorities and women in the workforce of the Supply Contractor shall be required, and the Supply Contractor is not required to grant any preferential treatment on the basis of race, sex, color, ethnicity or national origin in its employment practices. Notwithstanding the foregoing, any affirmative action requirements set forth in any federal regulations, statutes or rules included or referenced in the Contract documents shall continue to apply.

H. **Affirmative Action Measures:** Supply Contractor agrees to implement and/or maintain reasonable good faith efforts to comply with King County Code Chapter 12.16. The evaluation of a contractor's compliance with the Chapter shall be based upon the contractor's effort to achieve maximum results from its affirmative action measures. The Contractor

shall document these efforts and shall implement affirmative action steps at least as extensive as the following:

1. **Policy Dissemination:** Internal and external dissemination of the contractor's equal employment opportunity policy; posting of nondiscrimination policies and of the requirement of the Chapter on bulletin boards clearly visible to all employees; notification to each Subcontractor, labor union or representative of workers with which there is a collective bargaining agreement or other Contract, subcontract, or understanding of the contractor's commitments under the Chapter. Inclusion of the equal opportunity policy in advertising in the news media and elsewhere.

2. **Recruiting:** Adopt and implement recruitment procedures designed to increase the representation of women, minorities and Persons with disabilities in the pool of applicants for employment: including, but not limited to establishing and maintaining a current list of minority, women and disabled recruitment sources, providing these sources written notification of employment opportunities and advertising vacant positions in newspapers and periodicals which have minority, women and/or disabled readership.

3. **Self-Assessment and Test Validation:** Review of all employment policies and procedures, including tests, recruitment, hiring and training practices and policies, performance evaluations, seniority policies and practices, job classifications and job assignments to assure that they do not discriminate against, or have a discriminatory impact on, minorities, women and Persons with disabilities and validate all tests and other selection requirements where there is an obligation to do so under state or federal law.

4. **Record Referrals:** Maintain a current file of applications of each minority, women and Persons with disabilities who are applicants or referrals for employment indicating what action was taken with respect to each such individual and the reasons therefor. Contact these people when an opening exists for which they may be qualified. Names may be removed from the file after twelve Months have elapsed from their last application or referral.

5. **Notice to Unions:** Provide notice to labor unions of the contractor's nondiscrimination and affirmative action obligations pursuant to King County Code Chapter 12.16. Contractors shall also notify the M/WBE and Contract Compliance Division if labor unions fail to comply with the nondiscrimination or affirmative provisions.

6. **Supervisors:** Ensure that all supervisory Personnel understand and are directed to adhere to and implement the nondiscrimination and affirmative action obligations of the contractor under King County Code Chapter 12.16. Such direction shall include, but not be limited to, adherence to, and achievement of, affirmative action policies in performance appraisals of supervisory Personnel.

7. **Employee Training:** When reasonable, develop on-the-job training opportunities which expressly include minorities, women, and Persons with disabilities and sponsor and/or utilize, training/educational opportunities for the advancement of women, minorities and Persons with disabilities employed by the contractor, subject to Acceptance by the county.

8. **Responsible Person:** Designate an employee who shall have the responsibility for implementation of the Supply Contractor's affirmative action measures.

9. **Progress Reporting:** Prepare as part of the affirmative action plan an analysis and report on the progress made toward eliminating the underrepresentation of minorities, women, and Persons with disabilities in the contractor's workforce on an annual basis.

I. During the performance of this Contract, neither the Supply Contractor nor any party subcontracting under the authority of this Contract shall discriminate nor tolerate harassment on the basis of race, color, sex, religion, nationality, creed, marital status, sexual orientation, age, or the presence of any sensory, mental or physical disability in the employment or application for employment or in the administration or delivery of Services or any other benefits under this Contract.

J. Supply Contractor agrees to Provide reasonable access upon request to the premises of all places of business and employment, relative to Work undertaken in this Contract, and to records, files, information and employees in connection therewith, to the M/WBE and Contract Compliance Division or agent for purposes of reviewing compliance with the provisions of this Affidavit and agrees to cooperate in any compliance review.

K. Should the M/WBE and Contract Compliance Division find, upon complaint investigation or review, the Supply Contractor not to be in good faith compliance with the provisions contained in this Affidavit, it shall notify the County and Supply Contractor in writing of the finding fully describing the basis of non-compliance. Supply Contractor may request withdrawal of such notice of noncompliance at such time as the compliance office has notified in writing the Supply Contractor and the County that the noncompliance has been resolved.

L. The Supply Contractor agrees that any violation of any term of this Affidavit, including reporting requirements, shall be deemed a violation of King County Code Chapter 12.16. Any such violation shall be further deemed a breach of a material provision of the Contract between the County and the Supply Contractor. Such breach may be grounds for implementation of any sanctions Provided for in the Chapter, including but not limited to, cancellation, termination or suspension, in whole or part, of the Supply Contractor by the County; liquidated damages; or disqualification of the Supply Contractor PROVIDED, that the implementation of any sanctions is subject to the notice and hearing provisions of King County Code Chapter 12.16.110.

Supply Contractor:_____
Company Name Street Address City State Zip

I have read and understood the foregoing; and am authorized on behalf of the Supply Contractor to agree to the terms and conditions of this and Affidavit and Certificate of Compliance and therefore, execute the same.

Authorized Signer:_____
Name (type or print) Title Phone Signature

VALID ONLY IF NOTARIZED

SUBSCRIBED AND SWORN TO BEFORE ME THIS _____DAY OF _____, 2003.

_____
Signature of notary public)

_____
(Printed name of notary public)

Notary Public in and of the state of _____

My appointment expires:

_____

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King County

ATTACHMENT G

CURRENT OR FORMER KING COUNTY EMPLOYEE DISCLOSURE FORM

RFP NO: 03-013-PR

(Complete if applicable. If not, mark N/A –"Not Applicable")

1. Identify current or former employees of the County involved in the preparation of this Proposal or the anticipated performance of the Work or Services to be Provided on this Contract.

   Name of current or former Employee: _____

   Date of Last Employment with the County: _____

2. The Supply Contractor is responsible for notifying the County's Project Manager of current or former County employees who become involved in the Contract any time during the term of the Contract:

   Name of Firm: _____

   Authorized Signature: _____

   Printed Name: _____

   Title: _____

   Date: _____

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King County

SECTION 7 - TECHNICAL SPECIFICATIONS

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DRAWINGS

N001	Power Generation Process Diagram
M001	Power Generation Floor Plan
M002	Power Generation Second Level Plan
M003	Power Generation Section
E001	Electrical One-Line Diagram

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. This Section contains a summary of the work in this Contract and other known related work.

B. The work to be performed under this Contract consists of furnishing all equipment, materials, supplies, and manufactured articles; furnishing all labor, transportation, and services, including fuel, power, water, and essential communications; and performing all work or other operations required for the fulfillment of the Contract, in strict accordance with the Contract documents. Provide all work, materials, and services not expressly indicated in the Contract which may be necessary for the complete and proper supply, testing, and startup of the work.

1.02 WORK OF THIS CONTRACT

A. The work of this Contract consists of:
   1. Two engine-generator systems capable of using digester gas and natural gas fuel. The units are each to be capable of 2.3 to 2.9 MW power output on any mixture of digester or natural gas. The engines are to be designed to limit emissions and meet the specified emissions limit.
   2. Heat recovery and waste heat equipment is to be included. Heat is to be recovered from the engine jacket water, the oil, the exhaust, and the engine intercooler. Radiators are to dispose of any heat that the plant cannot use. Radiators are to meet noise requirements specified.
   3. Exhaust systems with silencers are to meet noise requirements specified
   4. Engine-generator protective devices are to protect the electrical systems and provide for safe operation. Controls are to regulate operation of the various systems, optimize fuel efficiency, and keep the emissions within specifications.
   5. Electrical switchgear will provide electrical protection and switching to interface with the plant electrical system.
   6. Packaging and shipping will encompass the protection and delivery of the systems to the West Point Treatment Plant in Seattle, WA.
   7. Factory testing will verify that the engine-generator systems are capable of meeting the specified power output, fuel economy, and emissions limits.
   8. Assistance during engineering, installation, and startup will provide details for design, assurances that the equipment is installed as required, and that the systems are proven at the site.
   9. Assistance during commissioning will be required to assure that the systems will perform as specified over an extended period of time while operated by the County under the review of the Supply Contractor.
   10. Training will be required for the operation and maintenance of the engine-generator systems supplied.

B. Accomplishment of work in the Contract Documents shall meet all requirements and dates specified by Section 01014.

C. Section 11093 specifies Programmable Logic Controllers (PLC's) that have been pre-selected by the County and for which a price has already been negotiated with the supplier as indicated in Section 11093. Proposals shall include one of the pre-selected PLC's. Proposer's may also propose an alternate in addition to one of the pre-selected PLC's for the County's consideration.

D. The above description is not intended to be complete. The work to be completed is provided for in the Contract Documents. The listing in Paragraph 01010-1.02A is not intended to relieve the Supply Contractor of the responsibility for reading and understanding the Contract Documents.

1.03 WORK UNDER OTHER COUNTY CONTRACTS OR BY COUNTY STAFF

A. The County will contract with an Installation Contractor to make the modifications to the plant buildings, electrical system, and piping systems in preparation for installation of the equipment provided under this Contract. The Installation Contractor will unload the equipment and set it in place as directed by the Installation Contractor's contract. This is to include manufacturer's recommended installation procedures provided by the Supply Contractor. The Installation Contractor will connect electrical and piping systems in preparation for inspection, check out, startup, testing, and commissioning by the Supply Contractor.

B. The County will contract with an independent laboratory to conduct emissions tests to determine if the Contract requirements are met.

C. The County plans to have Puget Sound Energy Co. install a new natural gas pipeline that will provide natural gas as a supplemental fuel for the engine-generators.

1.04 OTHER RELATED CONTRACTS

A. Cooperate and coordinate with all agencies, trades, and contractors involved in the execution of these and other contracts that may not be listed above.

1.05 SPECIFICATION LANGUAGE

A. Specifications are written mostly in imperative and streamlined form. Unless indicated otherwise, this imperative language is directed to the Supply Contractor. Additionally, the words "shall be" shall be included by inference where a colon (:) is used within sentences or phrases.
   1. Examples:
      a. Aggregate: ASTM C33.
      b. Adhesive: spread with notched trowel.

B. Related Sections: Individual Specification sections may include a paragraph entitled "Related Sections". Specification sections are listed within the paragraph to assist the Supply Contractor in locating related work. The list is not necessarily all inclusive. Use all specifications required to complete the work.

C. Meet the following state of Washington legal requirements whenever there is reference to certification of documents by an architect, engineer, land surveyor, or landscape architect,:
   1. Architect: RCW 18.08.420(7), RCW 18.08440(5) WAC 308-12-081.
   2. Engineers and land surveyors: RCW 18.43.070, RCW 18.43.130(8)(h), WAC 196-24-095.
   3. Landscape architects: RCW 18.96.150.

D. Whenever there is wording stating that an item is "as specified" or "as shown", the reference is to all Technical Specifications and all Drawings in the Contract Documents. Stating "as specified" or "as shown" does not refer necessarily to a Drawing or Specification, but it refers to either.

E. Unless otherwise indicated, all materials and equipment incorporated into the Work shall be as specified and shall be new and of good quality.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01730

OPERATIONS AND MAINTENANCE INFORMATION

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies operating and maintenance (O&M) information and manuals.

1.02 SUBMITTALS

A. Procedures: Section 01300

B. O&M information

C. Bound O&M Manual

1.03 CONTENT

A. Where specified, provide O&M information for equipment and material. The following items of information shall be provided:
   1. Names and addresses of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier(s) of the manufacturer's equipment and parts.
   2. Significant design criteria including pertinent calculations used in designing, selecting, or verifying the suitability of the installed equipment.
   3. Pump curves: manufacturer’s certified curve when specified in the Contract; otherwise, manufacturer’s catalog curve.
   4. Lubrication information: manufacturer's recommendations regarding the lubricants to be used and lubrication schedule to be followed.
   5. Control diagrams: include diagrams for internal and connection wiring.
   6. Installation and startup procedures: manufacturer's recommendations for installation, adjustment, calibration, and troubleshooting.
   7. Operating procedures: manufacturer's recommended step-by-step procedures for starting, operating, and stopping the equipment under specified modes of operation.
   8. Preventive maintenance procedures: manufacturer's recommended steps and schedules for maintaining the equipment.
   9. Overhaul instructions: manufacturer's directions for the disassembly, repair, and reassembly of the equipment, and any safety precautions that must be observed while performing the work.
   10. Spare parts list: manufacturer's recommendations of number of parts which should be stored by the County and special storage precautions which may be required, as well as the generic title and identification number of each component part of the equipment.
   11. Exploded view or plan and section views: detailed plan and section views of equipment when exploded views are not available. All views shall have detailed part callouts matching those callouts of the parts list. Exploded or cut views of equipment shall be provided, if available, as a standard item of the manufacturer's information.
   12. Specific information: as necessary where items of information are not included in the above list but are required.

PART 2 PRODUCTS

2.01 BINDER MATERIALS

A. Binders for final bound O&M manuals:
   1. 3-post.
   2. Durable covers with metal piano hinges and locking slide bar assembly.
   3. Capable of extending to a maximum 5-inch thickness.

B. Acceptable Manufacturer: Avery Arch Ring Binder with Metal Hinge (#98086), or approved equal.

PART 3 EXECUTION

3.01 INITIAL SUBMITTAL

A. Manufacturer's standard brochures and manuals used to describe the equipment and the O&M procedures shall be modified to reflect only the model or series of equipment used. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

B. Photocopies of manufacturer's standard brochures and manuals will not be approved for the final bound sets.

C. Facsimile paper or photocopies of facsimile information will not be allowed.

D. Disposition of O&M information will be noted on the returned submittals. Only O&M information with a disposition of “1” or “2” shall be included in the O&M final bound sets.

E. Initial submittal shall be provided 2 months in advance of Performance Testing.

3.02 FIELD CHANGES

A. Following the accepted installation and operation of an equipment item, the item's instructions and procedures shall be modified and supplemented to reflect field changes or additional field data information.

3.03 FINAL BOUND SETS

A. Following start-up, but prior to acceptance of the work, provide five binders of the approved O&M information. The information shall be organized in the binders in numerical order by the Specification Sections. All brochures and manuals contained therein shall be appropriately labeled with the applicable equipment name and equipment number as it appears in the Contract Documents, and shall also indicate the Specification Section.

B. Each binder shall contain a table of contents and spare parts information and shall be provided with tab sheets to permit easy location of the desired sections of the manual.

C. Each binder shall contain an index that includes a complete equipment list in alpha-numerical order by the equipment numbers assigned in the Contract Documents. Each equipment number shall be cross-referenced to the applicable Specification Section tab located in the manuals.

F. Each binder shall include a copy of the Spare Parts Documentation Forms submitted per Section 01750 and the Warranty Forms per Section 01740.

END OF SECTION

SECTION 01662

COMMISSIONING

PART 1--GENERAL

1.01 DESCRIPTION

This section contains requirements for the Supply Contractor's performance during the commissioning of the structures, equipment and systems constructed and installed during the course of this contract. All commissioning work, as described in this section, shall be performed by the Supply Contractor.

1.02 QUALITY ASSURANCE

A. CLEANUP:

Following completion of the operational testing period, the Supply Contractor shall remove, clean, and replace all permanent and temporary filters and strainers and provide assistance to the Installation Contractor as the system is cleaned up and made ready for final inspection as a condition precedent to commissioning.

B. COMMISSIONING TEAM:

The Supply Contractor shall assemble a commissioning team under the direction of an individual duly authorized to commit the Supply Contractor's personnel and resources to respond to requests for assistance on the part of the Construction Manager or, through the Construction Manager, the County. The commissioning team shall consist of representatives of the Supply Contractor's and the Installation Contractor’s personnel as specified in Section 11093 3.05. The commissioning team shall be available as specifed in Section 11093 3.05. The commissioning team shall at all times be equipped and ready to provide for emergency repairs, adjustments, and corrections to the equipment and systems installed and modified as a part of this contract.

1.03 SUBMITTALS

The following information shall be submitted to the Construction Manager in accordance with the provisions of Section 01300:

1. Detailed plans for commissioning the equipment as specified in Section 11093 3.05.

2. The Supply Contractor's plan for providing a commissioning team conforming to the requirements of paragraph 01662-1.02 B during the commissioning period. The plan shall be complete with a daytime staffing plan and names, qualifications, and telephone numbers of those assigned to off-hour standby duty.

PART 2--PRODUCTS

Working with representatives of the County and the Construction Manager, the Supply Contractor shall develop and produce a detailed, written plan for the startup and initial operation, under actual operating conditions, of the equipment and systems installed and constructed under this contract. The document, after acceptance by the Construction Manager, shall serve as the guidance manual for the commissioning process.

PART 3--EXECUTION

After completion of the equipment and system performance and operational testing and agreement on the part of the Construction Manager that the systems did meet all test requirements, commissioning will begin. The commissioning period shall be as specified in Section 11093 3.05. The Supply Contractor shall perform the tasks necessary to make the improvements constructed under this contract fully operational. The Construction Manager shall confirm in writing the date(s) that the system is ready for commissioning and on which actual commissioning activities commence. Activities conducted prior to such written confirmation shall not constitute commissioning. The commissioning process shall be as specified in Section 11093 3.05

The County's operation and maintenance personnel will be responsible for operation of the systems to be commissioned. The portion of the work to be commissioned shall be fully operational, performing all functions for which it was designed.

The Supply Contractor shall be available at all times during commissioning periods to provide immediate assistance in case of failure of any portion of the system being constructed. At the end of the commissioning period and when all corrections required by the Construction Manager to assure a reliable and completely operational facility are complete, the Construction Manager shall issue a completion certificate. Each system shall have been issued a completion certificate as a condition precedent to the final acceptance of the work of this contract.

During the commissioning period, the County shall be responsible for all normal operational costs and the Supply Contractor shall bear the costs of all necessary repairs or replacements, including labor and materials, required to keep the portion of the plant being commissioned, operational.

****END OF SECTION****

SECTION 01660

SUPPLY CONTRACTOR'S SERVICES DURING INSTALLATION, TESTING, COMMISSIONING, AND TRAINING

PART 1--GENERAL

1.01 DESCRIPTION

A. This section contains requirements for the Supply Contractor's performance in support of installation of equipment provided under this Contract. This will include on site quality assurance tasks including job site assistance during equipment delivery, installation supervision, startup supervision, site testing support and supervision, commissioning and training. This section supplements but does not supersede specific testing requirements found elsewhere in this Contract.

1.02 QUALITY ASSURANCE

A. SUPPLY CONTRACTOR'S QUALITY ASSURANCE MANAGER: The Supply Contractor shall appoint an operations engineer or equally qualified operations specialist as Quality Assurance Manager to manage, coordinate, and supervise the Supply Contractor's quality assurance program. The Quality Assurance Manager shall have at least 5 years of total experience, or experience on at least five separate projects, in managing the startup commissioning of cogeneration engine-generators. Operations engineers shall be graduates from a minimum 4-year course in mechanical or civil engineering. Operations specialists shall have equivalent experience in plant operation and maintenance. The Project Representative for the County shall reserve the right to witness all testing described in this Section.

B. INSTRUMENTATION AND CONTROLS START UP ENGINEER: An instrumentation and controls start up engineer shall be present during testing and start up activities and shall be responsible for certifying the system controls. This shall include assistance in start up and debugging and tuning of the system controls provided under this Contract as well as certification of controls related work performed by the Installation Contractor. The instrumentation and controls start up engineer shall be an experienced instrumentation and controls engineer or technician experienced in the operation and calibration, programming and tuning of the cogeneration controls related electronic instrumentation and microprocessor based controls supplied with the equipment furnished under this Contract. The instrumentation and controls start up engineer shall have controls experience on gas reciprocating engines cogeneration projects of similar controls complexity. The instrumentation and controls start up engineer shall also have programming proficiency in the microprocessor based controls supplied under this Contract and shall be able to on-line and off-line edit any controller logic if required for fine tuning the controls being provided.

C. SUPPLY CONTRACTOR SERVICES: The Supply Contractor shall coordinate with the Installation Contractor to provide required services during installation as described in these specifications. The following services are expected of the Supply Contractor:
   1. Unloading and Installation Assistance: Prior to unloading the equipment at the project site, the Supply Contractor, the Installation Contractor, and the Project Representative will make a joint inspection of the equipment items and will note in writing, all identified defects or omissions in the equipment. The Supply Contractor is responsible for making any necessary corrections at no additional cost to the County. The Supply Contractor shall provide installation instructions for all equipment provided under this Contract and provide expert on site assistance to the Installation Contractor for any equipment requiring specialized installation requirements.

2. Pre-Operational Checkout: The Supply Contractor's Quality Assurance Manager shall be responsible for inspecting the installation of the equipment, and making the necessary adjustments to the installed equipment for satisfactory operation prior to field testing. The Supply Contractor shall provide a Certificate of Readiness stating that the equipment has been installed in accordance with the Supply Contractor's recommendation, and has been inspected by the Supply Contractor's Quality Assurance Manager, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed, and that the proper electrical and mechanical connections have been made. In addition, the Supply Contractor shall provide certification that all instrumentation provided under this Contract have been calibrated. These checks are required prior to initial energization of the equipment for applied power testing.
3. Field Testing: Pre-operational checkout shall be followed by pre-operational testing. Pre-operational testing will be performed by the Installation Contractor for equipment included in this Contract and will include electrical testing for motors, including observation of correct rotation and unusual vibration, switchgear, conductors etc, pressure and leakage testing of piping and tanks, and control wiring ring out. The Supply Contractor shall provide oversight of this testing and certify that the testing has been completed satisfactorily. Once the pre-operational steps have been completed, and the installation of required auxiliary support equipment and systems has been completed under the Installation Contract, the system and equipment performance testing with applied power can be conducted. The Supply Contractor shall conduct this testing for their equipment and systems and shall include loops testing and tuning. This testing will be followed by system operational testing which will be a full extended functional performance test of the complete system.
4. Commissioning Assistance: The Supply Contractor shall conduct final performance testing and commissioning, as required by the specifications. These services shall continue until the applicable equipment or system has been successfully commissioned and has been accepted by the County for full-time operation. Commissioning support is specified in Section 01662.
5. Training of Owner's Personnel: The Supply Contractor shall provide detailed instructions to County personnel for operation of the specified equipment. These training services shall include pre-startup classroom and on-site equipment instruction; post-startup classroom and on-site equipment instruction; and factory classroom training. Training requirements are further described in the individual equipment specifications.
6. For the purposes of this section, a system shall include all items of equipment, devices and appurtenances connected in such a fashion as their operation or function complements, protects or controls the operation or function of the others. The Quality Assurance Manager shall coordinate the activities of all subcontractors and suppliers to implement the requirements of this section.

D. REFERENCES:
1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of the Public announcement of Request for Proposals. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI/ASME B40.1	Gauges Pressure Indicating Dial Type—Elastic Element
ASTM E77	Method for Verification and Calibration of Liquid-in-Glass Thermometers
ASHRAE 41.8	Standard Methods of Measurement of Flow of Gas

1.03 SUBMITTALS

A. Submittal material, to be submitted in accordance with Section 01300, shall consist of the following:
   1. A complete description of the Supply Contractor's plan for documenting the results from the test program in conformance with the requirements of paragraph 01660-2.02 A, including:
      a. Proposed plan for documenting the calibration of all test instruments.
      b. Proposed plan for calibration of all instrument systems, including flow meters and all temperature, pressure, weight, and analysis systems.
      c. Sample forms for documenting the results of field pressure and performance tests.
   2. The credentials and certification of the testing laboratory proposed by the Supply Contractor for calibration of all test equipment.
   3. Preoperational check-out procedures, reviewed and approved by the respective equipment manufacturers.
   4. Detailed testing plans, setting forth step-by-step descriptions of the procedures proposed by the Supply Contractor for the systematic testing of all equipment and systems provided under this contract.
   5. A schedule and subsequent updates, presenting the Supply Contractor's plan for testing the equipment and systems provided under this contract.
   6. A schedule establishing the expected time period (calendar dates) when the Supply Contractor plans to commence operational testing of the completed systems, along with a description of the temporary systems and installations planned to allow operational testing to take place.
   7. A summary of the Quality Assurance Manager's qualifications, showing conformance to paragraph 01660-1.02 A requirements.
   8. A summary of the Instrumentation and Controls Startup Engineer’s qualifications, showing conformance to requirements of paragraph 01660-1.02 B.

PART 2--PRODUCTS

2.01 GENERAL

A. The Supply Contractor shall prepare test plans and documentation plans as specified in the following paragraphs. The Project Representative will not witness any test work for the purpose of acceptance until all test documentation and calibration plans and the specified system or equipment test plans have been submitted and accepted.

2.02 DOCUMENTATION

A. DOCUMENTATION PLANS:
   1. The Supply Contractor shall develop a records keeping system to document compliance with the requirements of this Section. Calibration documentation shall include identification (by make, manufacturer, model, and serial number) of all test equipment, date of original calibration, subsequent calibrations, calibration method, and test laboratory.
   2. Equipment and system documentation shall include date of test, equipment number or system name, nature of test, test objectives, test results, test instruments employed for the test, and signature spaces for the Project Representative's witness, the Supply Contractor's quality assurance manager, and for the Instrumentation and Controls Startup Engineer where

applicable. A separate file shall be established for each system and item of equipment. These files shall include the following information as a minimum:

a. Metallurgical tests
b. Factory performance tests
c. Field calibration tests[1]
d. Field pressure tests[1]
e. Field performance tests[1]
f. Field operational tests[1]

3. The Supply Contractor shall develop test documentation forms specific to each item of equipment and system installed under this contract. Acceptable documentation forms for all systems and items of equipment shall be produced for review by the Project Representative as a condition precedent to the Supply Contractor's receipt of progress payments. Once the Project Representative has reviewed and taken no exception to the forms proposed by the Supply Contractor, the Supply Contractor shall produce sufficient forms, at his expense, to provide documentation of all testing work to be conducted as a part of this contract. All testing documentation shall include provisions for sign off by the Project Representative and no testing will be considered complete without this sign off.

B. TEST PLANS:

1. The Supply Contractor shall develop test plans detailing the coordinated, sequential testing of each item of equipment and system provided under this contract. Each test plan shall be specific to the item of equipment or system to be tested. Test plans shall identify by specific equipment or tag number each device or control station to be manipulated or observed during the test procedure and the specific results to be observed or obtained. Test plans shall also be specific as to support systems required to complete the test work, temporary systems required during the test work, subcontractors' and manufacturers' representatives to be present and expected test duration. Also identify any support or assistance required of the Installation Contractor including nature of assistance and manpower requirements. As a minimum, the test plans shall include the following features:

a. Identify any special testing requirements for the testing that will be conducted by the Installation Contractor such as for piping testing or electrical testing.
b. Calibration of all analysis instruments and control sensors.
c. Performance testing of each individual item of mechanical, electrical, and instrumentation equipment. Performance tests shall be selected to duplicate the operating conditions described in the Contract.
d. System tests designed to duplicate, as closely as possible, operating conditions described in the Contract.

2. Test plans shall contain a complete description of the procedures to be employed to achieve the desired test environment.
3. As a condition precedent to receiving progress payments due to the Supply Contractor eight weeks in advance of the date the Supply Contractor wishes to begin any testing work (whichever occurs earliest in the project schedule), the Supply Contractor shall have submitted all test plans required for the systematic field performance and operational tests for all equipment and systems provided under this contract. Once the Project Representative has reviewed and taken no exception to the Supply Contractor's test plans, the Supply Contractor shall reproduce the plans in sufficient number for the Supply Contractor's purposes and an additional ten copies for delivery to the Project Representative. No test work shall begin until the Supply Contractor has delivered the specified number of final test plans to the Project Representative.

C. TESTING SCHEDULE: The Supply Contractor shall produce a testing schedule setting forth the sequence contemplated for performing the test work. The schedule shall be in bar chart form, plotted against calendar time, shall detail the equipment and systems to be tested, and shall be coordinated with the Installation Contractor's construction schedule to be provided by King County.

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[1]Each of these tests is required even though not specifically noted in detailed specification section.

The schedule shall show the contemplated start date, duration of the test and completion of each test. The test schedule shall be submitted no later than 4 weeks in advance of the date testing is to begin and any specific test shall be reconfirmed to the Project Representative within 14 days of each test. The Project Representative will not witness any testing work for the purpose of acceptance until the Supply Contractor has submitted a schedule to which the Project Representative takes no exception. The test schedule shall be updated weekly, showing actual dates of test work, indicating systems and equipment testing completed satisfactorily and meeting the requirements of this Contract.

2.03 SYSTEM AND EQUIPMENT PERFORMANCE TESTS

A. The Supply Contractor shall be responsible for conducting system and equipment performance tests with assistance from the Installation Contractor. These tests shall be conducted after pre-operational check out and testing have been performed and signed off by the Supply Contractor and accepted by the Project Representative. Testing shall be scheduled and coordinated with the Installation Contractor such that necessary auxiliary systems provided under the Installation Contract are installed and ready for operation in support of these tests. Each item of mechanical, electrical, and instrumentation equipment provided under this contract shall be tested to demonstrate compliance with the performance requirements of this Contract. Control loops shall be tested and optimized by final tuning. Once this is completed, equipment shall be tested as sub-systems and each sub-system shall be tested to demonstrate compliance with the performance requirement of this Contract. Following sub-system testing, the full system shall be readied for full system operational testing. All testing shall be documented and signed off by the Supply Contractor and Project Representative and the Instrumentation and Controls Startup Engineer where applicable. For systems which support operation of equipment provided under this Contract but are provided under the Installation Contract, the Supply Contractor shall also include in their Certification of testing that the support systems are functioning as required. Specific additional requirements for tests are specified in the individual equipment specifications in these Contract documents.

2.04 OPERATIONAL TESTS

A. Once all equipment and systems have been tested individually, the Supply Contractor shall conduct operational testing of the complete system with the Installation Contractor. During the operational testing period, the Supply Contractor's Quality Assurance Manager and testing team shall operate the equipment and monitor the characteristics of each machine and system and report any unusual conditions to the Project Representative. All of the operational features of the full system provided shall be tested and documented.

2.05 PRODUCT DATA

A. Product data, to be provided in accordance with Section 01300, shall be the original and three copies of all records produced during the testing program.

PART 3--EXECUTION

3.01 GENERAL

A. The Supply Contractor's Quality Assurance Manager/Instrumentation and Controls Startup Engineer shall organize teams made up of qualified representatives of equipment suppliers, subcontractors, the Supply Contractor's independent testing laboratory, and others, as appropriate, to efficiently and expeditiously calibrate and test the equipment and systems provided under this contract. The objective of the testing program shall be to demonstrate, to the Project Representative's complete satisfaction, that the structures, systems, and equipment provided under this contract meet all performance requirements and the facility is ready for the commissioning process to commence. In

addition, the testing program shall produce baseline operating conditions for the County to use in a preventive maintenance program.

3.02 CALIBRATION OF INSTRUMENTS

A. All test equipment (gages, meters, thermometers, analysis instruments, and other equipment) used for calibrating or verifying the performance of equipment installed under this contract shall be calibrated to within plus or minus 2 percent of actual value at full scale. Test equipment employed for individual test runs shall be selected so that expected values as indicated by the detailed performance specifications will fall between 60 and 85 percent of full scale. Pressure gages shall be calibrated in accordance with ANSI/ASME B40.1. Thermometers shall be calibrated in accordance with ASTM E77 and shall be furnished with a certified calibration curve.

B. Liquid flow meters, including all open channel flow meters and all meters installed in pipelines with diameters greater than 2 inches shall be calibrated in situ using either the total count or dye dilution methods. Gas flow meters installed in piping systems with diameters greater than 6 inches shall be calibrated in situ using the pitot tube velocity averaging method. Flow meter calibration work shall be performed by individuals skilled in the techniques to be employed. Calibration tests for flow metering systems shall be performed over a range of not less than 10 percent to at least 75 percent of system full scale. At least five confirmed valid data points shall be obtained within this range. Confirmed data points shall be validated by not less than three test runs with results which agree within plus or minus 2 percent.

C. Calibration of analysis instruments, sensors, gages, and meters installed under this contract shall proceed on a system-by-system basis. No equipment or system performance acceptance tests shall be performed until instruments, gages, and meters to be installed in that particular system have been calibrated and the calibration work has been witnessed by the Project Representative.

D. All analysis instruments, sensors, gages, and meters used for performance testing shall be subject to recalibration to confirm accuracy after completion, but prior to acceptance of each performance test. All analysis instruments, sensors, gages, and meters installed under this contract shall be subject to recalibration as a condition precedent to commissioning under the provisions of Section 01662.

3.03. PRESSURE AND LEAKAGE TESTS:

A. The Installation Contractor will conduct pressure and leakage tests in accordance with applicable portions of the installation specifications. If problems are observed with the Supply Contractor's equipment, it shall be the Supply Contractor's responsibility to make repairs in a timely manner. All acceptance tests shall be witnessed by the Project Representative. Evidence of successful completion of the pressure and leakage tests shall be the Project Representative's signature on the test forms prepared by the Installation Contractor.

3.04. SYSTEM AND EQUIPMENT PERFORMANCE TESTS:

A. GENERAL:
   1. Once all affected equipment has been subjected to the required preoperational check-out procedures and the Project Representative has witnessed and has not found deficiencies in that portion of the work, individual items of equipment and systems may be started and operated under simulated operating conditions to determine as nearly as possible whether the equipment and systems meet the requirements of these specifications. The equipment shall be operated a sufficient period of time to determine machine operating characteristics, including noise, temperatures and vibration; to observe performance characteristics; and to permit initial adjustment of operating controls. During the functional test period, the Supply Contractor shall obtain baseline operating data on all equipment with motors or generators greater than 1 horsepower to include amperage, bearing temperatures, and vibration (where bearing

temperature or vibration sensors are installed). The baseline data shall be collected for the County to enter in a preventive maintenance system.

2. Test results shall be within the tolerances set forth in the detailed specification sections of this Contract. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice. Where, in the case of an otherwise satisfactory functional test, any doubt, dispute, or difference should arise between the Project Representative and the Supply Contractor regarding the test results or the methods or equipment used in the performance of such test, then the Project Representative may order the test to be repeated. If the repeat test, using such modified methods or equipment as the Project Representative may require, confirms the previous test, then all costs in connection with the repeat test will be paid by the County. Otherwise, the costs shall be borne by the Supply Contractor. Where the results of any functional test fail to comply with the contract requirements for such test, then such repeat tests as may be necessary to achieve the contract requirements shall be made by the Supply Contractor at his expense.

B. RETESTING: If under test, any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed, or replaced, tests on that portion when so adjusted, altered, removed, or replaced, together with all other portions of the work as are affected thereby, shall, unless otherwise directed by the Project Representative, be repeated within reasonable time and in accordance with the specified conditions. The Supply Contractor shall pay to the County all reasonable expenses incurred by the County, including the costs of the Project Representative, as a result of repeating such tests.

C. POSTTEST INSPECTION: Once functional testing has been completed, all machines shall be rechecked for proper alignment and realigned, as required. All equipment shall be checked for loose connections, unusual movement, or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the Project Representative. All machines or devices which exhibit unusual or unacceptable operating characteristics shall be disassembled and inspected. Any defects found during the course of the inspection shall be repaired or the specific part or entire equipment item shall be replaced to the complete satisfaction of the Project Representative at no cost to the County.

3.05 OPERATIONAL TESTS

A. The Supply Contractor shall provide system operation testing. After completion of all performance testing and certification by the Project Representative that all equipment complies with the requirements of the specifications, all domestic water, oil, air, and chemical systems shall be filled with the specified fluid.

B. Upon completion of the filling operations, the Supply Contractor shall operate the completed facility for a period of not less than 24 hours, during which all parts of the system shall be operated as a complete facility, operating in parallel with the electrical utility, at various loading conditions, as directed by the Project Representative. The operational testing period shall commence after this initial period of variable operation. The operational testing period shall be 48 continuous hours in parallel with the utility plus 4 hours each in the other modes specified in Section 11093 3.04 E. Should the operational testing period be halted for any reason related to the facilities constructed or the equipment furnished under this contract, or the Supply Contractor's temporary testing systems, the operational testing program shall be repeated until the specified continuous period has been accomplished without interruption. All process units shall be brought to full operating conditions, including temperature, pressure, and flow.

3.06 COORDINATION MEETINGS

A. The Quality Assurance Manager, the Instrumentation and Controls Startup Engineer, and any other major equipment vendor representatives that need to participate in the test coordination meetings shall attend a startup coordination meeting at the project site. Startup coordination

meetings will be scheduled by the Project Representative and will be approximately one month in advance of the date for performance testing for each system or equipment item. This meeting will include the Project Representative and the Installation Contractor.

B. Startup coordination meeting shall consist of a review of the Supply Contractor's Testing and Startup Plan, coordination of the Installation Contractor's activities, and coordination of the County's activities necessary to accommodate the Supply Contractor's startup activities for the supplied system.

C. Unless otherwise directed by the Project Representative, the Quality Assurance Manager, the Instrumentation and Controls Startup Engineer, the Project Representative, and the Installation Contractor shall attend weekly startup coordination meetings when performance testing of the system furnished under this Contract. Weekly meetings shall continue until operational testing of the generation installation is complete and the Project Representative has issued the certificate of substantial completion for the installation. Startup meetings will be scheduled by the Project Representative.

END OF SECTION

SECTION 01600

STORAGE, SHIPMENT, AND PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION

A. The engine-generator and associated appurtenances and equipment, including heat recovery and waste heat equipment, switchgear, control cabinets, and all other items supplied under this Contract shall be shipped, handled and stored in a manner that will prevent damage to the items.

B. Supply Contractor shall be responsible for and make good on any and all damages until the equipment is delivered and accepted at the job site. Insurance covering damage from any and all sources shall be provided, and the Supply Contractor shall guarantee delivery in good condition.

PART 2 PRODUCTS

2.01 SUBMITTALS

A. Submit a plan for protection, loading, shipping, unloading, storing, and maintaining the equipment in storage.

B. Submit the Notice of Delivery as specified in this Section.

PART 3 EXECUTION

3.01 STORAGE AND MAINTENANCE

A. The Supply Contractor shall store completed work prior to shipment to the job site until the Supply Contractor receives a Notice to Deliver from King County according to this Section. The Supply Contractor shall not ship any equipment prior to receipt of the County's Notice To Deliver.
   1. Store all materials and products indoors in secure buildings.
   2. Provide environmentally controlled storage facilities for materials requiring environmental control for protection.
   3. Supply Contractor's storage facilities shall be subject to King County's approval
   4. Handle and store all materials and products in accordance with the manufacturer's written recommendations and in a manner to prevent damage.

B. Supply Contractor shall provide manufacturer's recommended maintenance during storage and until the products are delivered and accepted by the County at the job site.

C. Store products to provide access for inspection and inventory control.

3.02 DELIVERY TO JOB SITE

A. Prior to shipment, the Supply Contractor shall investigate conditions of the transportation facilities, such as clearances, restrictions, bridge load limits, and other limitations affecting transportation. Any such limitations of the transportation facilities shall not become the basis for claims or damages against the County or for extension of time for completion of the work or delivery. Note that the entry portal to the West Point Treatment Plant has a 6-foot 6-inch height limit.

B. The Supply Contractor shall provide all equipment and labor necessary to deliver the products to the job site. The Supply Contractor shall obtain all necessary permits and approvals to deliver the products to the job site. All protective coverings and restraints required to secure and transport the products shall be provided by the Supply Contractor.

C. King County will require product shipment to the job site in the following three modules:
   1. Engine-generator set
   2. Heat recovery and waste heat equipment and other auxiliary equipment such as radiators and exhaust silencers.
   3. Switchgear and electrical panel or cabinets
   4. Supply Contractor shall be responsible for loading the equipment onto transportation vehicles and for transportation to the job site. The products shall be delivered to the West Point Treatment Plant. The delivery address is:
      King County / West Point Treatment Plant
      Fort Lawton, Discovery Park
      1400 Utah Street West
      Seattle, Washington 98199

3.03 DELIVERY NOTIFICATIONS

A. King County will issue to the Supply Contractor a Notice To Deliver which will identify specific equipment to be delivered and the date the equipment is to arrive at the West Point Treatment Plant. The Notice To Deliver will give the Supply Contractor a 21-day advance notice of delivery prior to the required product delivery time at the West Point site.

B. The Supply Contractor shall provide to the County, prior to shipping, a 7 calendar-day advance Notice of Delivery, followed by a 24 hour notice prior to the expected delivery time at the delivery site(s).

   1. The 7 day notice shall include:
      a. Method of shipment and carrier's name.
      b. Type of truck being used for delivery to the site.
      c. List of products to be shipped.
      d. Approximate shipping weight of the products and, if shipped in components, the number of components and approximate weight of each.
      e. Recommended unloading and handling method.
      f. Storage and protection requirements prior to installation.

   2. The 24 hour notice shall include:
      a. The approximate hour of delivery.

C. Expenditures and/or damages resulting from the Supply Contractor's failure to adhere to, and comply with, the specified delivery times, coordination, and delivery requirements shall be the responsibility of the Supply Contractor.

3.04 LABELING

A. All parts shall be marked for identification. The Supply Contractor shall furnish to the County, at or before the time of shipment, full information concerning marking or labeling.

B. After the equipment has been prepared for shipping, each shipping unit shall be plainly marked by stencil or equivalent with the Contract number, the piece mark number, and the weight.

3.05 RECEIVING, INSPECTING, AND UNLOADING AT JOB SITE

A. The Installation Contractor will be responsible for unloading the equipment at the West Point site according to the Supply Contractor's unloading recommendations.

B. Prior to unloading products at the job site, the Supply Contractor, the Installation Contractor, and the Project Representative will make a joint inspection of the condition of each product item and will note in writing all defects or omissions in the products. Findings of such inspections shall be noted on Form 01011-B (attached herein), and signed by the representatives of all parties present. Damage to the products or loss of products, during shipment and prior to unloading and transfer of products to

the Installation Contractor, shall be repaired or replaced by the Supply Contractor at its sole expense. The Supply Contractor shall expedite replacement of damaged, incomplete, or lost items.

3.06 DELIVERY HOURS

A. Product deliveries to the job site shall be allowed during weekdays from 7:30 a.m. to 3:30 p.m. No product shall be delivered during other times of the day, weekends, or holidays, except with the written authorization of the Project Representative.

B. In the event that product deliveries require truck traffic outside the acceptable hours listed in this Section, the Supply Contractor shall request approval from the Project Representative at least 72 hours prior to the data of such deliveries. This request shall include the anticipated time and duration of the activities and the reasons why the activities cannot be undertaken within the hours listed.

C. Product deliveries shall place the equipment in the Installation Contractor's protected work area.

END OF SECTION

FORM 01300-B **SUBSTITUTION REQUEST FORM**

TO: _____

CONTRACT NO. C_____C: CONTRACT NAME: _____

We hereby submit for your consideration the following item instead of the specified item or procedure:

Section	Paragraph	Specified Item
_____	_____	_____

Proposed Substitution:

_____

_____

_____

_____

Attach complete data, including laboratory tests, if applicable. Include complete information on changes to Contract Drawings and/or Specifications which proposed substitution would require for its proper installation.

Fill in blanks below:

A. How will substitution affect dimensions shown on Drawings?

_____

_____

B. What effect does the substitution have on the Baseline or Update Schedule?

_____

_____

C. State quality and performance differences between proposed substitution and specified item or procedure.

_____

_____

_____

D. List the cost differences between proposed substitution and specified item or procedure. (Attach estimate/quote and indicate net change).

_____

_____

SUBSTITUTION REQUEST FORM

E. List manufacturer's name and address, trade name of product, and model or catalog number.

_____

_____

_____

F. Other information as required by the Project Representative.

_____

_____

_____

G. The undersigned states that the function, appearance and quality of the proposed substitution are equivalent or superior to those of the specified item and authorizes the payment to the County for all design changes including Project Representative, detailing, and County processing costs.

_____

_____

H. The undersigned states that there is a waiver of all claims for additional costs related to the substitution which may subsequently arise during the work.

_____

I. Manufacturer's guarantees the proposed and specified items are:

_____ Same _____ Different (explain on attachment)

Submitted by:

_____
Contractor Signature

_____
Firm

_____
Address

_____

Date: _____

For use by Project Representative

____ Accepted ____ Accepted as Noted

____ Not Accepted ____ Received Too Late

By: _____

Date:_____

Remarks: _____

NOTE: WHEN REQUIRED BY THE PROJECT REPRESENTATIVE, ALL SUBSTITUTIONS TO BE STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF WASHINGTON.

SECTION 01300

SUBMITTALS PROCEDURE

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies procedures and requirements for all submittals, substitutions, deviations, and the master submittal list required by the Specifications.

B. Submit descriptive information which will enable the Project Representative to assess whether the proposed materials, equipment, or methods of work are in general conformance with the work and in compliance with the Contract.

C. No fabrication or construction work shall occur on a specific submittal item without a submittal disposition stated in Paragraph 01300-3.03B.1 or -B.2.

1.02 MASTER SUBMITTAL LIST

A. Prepare and submit within 20 days after the effective date of the Notice to Proceed, a Master Submittal List listing all items for which submittals are required by the Specifications. Provide a schedule indicating the submittal dates for each submittal. Organize by Specification Section number and include the following information for all listed items:
   1. Item identification.
   2. Specification Section number.
   3. Identification of those items which are substitutions or contain deviations from the Specifications.
   4. Identification of those items which require other jurisdictional agency review and approval.
   5. Columns for future use as information becomes available shall be provided for the following items:
      a. Trade name, model, and catalog designation.
      b. The scheduled need dates for control purposes.
      c. Date submitted.
      d. The date approval is needed.
      e. The date on which material is needed.

1.03 SUPPLY CONTRACTOR RESPONSIBILITIES

A. Be responsible for the accuracy and completeness of the information contained in each submittal.

B. Verify that the material and equipment described in each submittal conforms to the requirements of the Contract prior to submittal.

C. Ensure that the material, equipment and methods of work used shall be as described in the submittal.

D. Ensure there is no conflict with other submittals. Notify the Project Representative where such submittal may affect the work of another submittal.

E. Ensure coordination of submittals among the suppliers, related crafts, subcontractors, and with the planned work.

F. Submit a request in writing for all proposed substitutions using Form 01300-B.

G. Call out all deviations from the Contract on the submittal Form 01300-A received from the Project Representative and note where applicable in the body of the submittal.

1.04 APROVED EQUAL

A. Definition: an item of material or equipment proposed by the Supply Contractor that has the same function, quality, durability, appearance, strength, and design characteristics equal to that named, that meets the requirements of the Specification, and is sufficiently similar so that no change in related work is required. The item of material or equipment shall reliably perform at least equally well for the function imposed by the design concept of the completed work as a functioning whole. In general, approved equal applies to manufactured items.

B. Clearly mark on the submittal Form 01300-A.

C. Acceptance is at the Project Representative's sole discretion and the decision regarding acceptance or rejection shall be final. Supply Contractor shall not assume acceptance at any time prior to the rendering of decision by the Project Representative.

1.05 SUBSTITUTION

A. Definition: an item of material, equipment, means, method, technique, sequence, or procedure which functionally meets the Contract requirements, but does not exactly meet the Specification and is equal to or better than the specified item.

B. Submit a request for substitution with the submittal. Use Form 01300-B and address and complete all items in the form. The request shall include complete specifications or means and methods for the item including all descriptive and cost data.

C. Substitutions shall be authorized only by Change Order to the Contract.

D. Acceptance is at the Project Representative's sole discretion and the decision regarding acceptance or rejection shall be final. Supply Contractor shall not assume acceptance at any time prior to the rendering of decision by the Project Representative.

1.06 DEVIATIONS

A. Definition: related to changes to a specified procedure, material, or product proposed by the Supply Contractor that does not fully conform to the requirements specified, but can be shown to accomplish the intent and functional requirements of the end product.

B. Annotate in the submittal all deviations from stated requirements in the Contract. Failure to identify any deviation and subsequent acceptance of the submittal by the County shall not relieve the Supply Contractor from complying with the Contract.

C. Acceptance is at the Project Representative's sole discretion and the decision regarding acceptance or rejection shall be final. Supply Contractor shall not assume acceptance at any time prior to the rendering of decision by the Project Representative. A change order may be required by the Project Representative for an accepted deviation.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 TRANSMITTAL PROCEDURE

A. General:
   1. Submittals shall be accompanied by Submittal/Transmittal Form 01300-A received from the Project Representative. Equipment numbers shall be listed on Form 01300-A for items being submitted. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections for which a submittal is required. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review the group or package as a whole. No multiple-Section submittals will be allowed except where previously approved by the Project Representative.
   2. A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Original submittal numbers shall have the following format: "XXX"; where "XXX" is the sequential number assigned by the Supply Contractor. Resubmittals shall have the following format: "XXX-Y"; where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 25B, for example, is the second resubmittal of Submittal 25.
   3. Submit all proposed approved equals as a part of the submittal process.

3.02 SUBMITTAL COMPLETENESS

A. Submittals without all required information are not acceptable and may be returned. The Project Representative may choose to put an incomplete submittal on hold for up to seven days to allow time for the Supply Contractor to provide missing information. The on-hold time will be in addition to the days specified for the return of a submittal stated in Paragraph 01300-3.03B.

3.03 REVIEW PROCEDURE

A. Unless otherwise specified, for each submittal, submit the following:
   1. One reproducible original of all submitted information. Individual sheets shall not exceed 22 inches x 34 inches.
   2. Seven additional copies of each submittal including all submitted information.
   3. Samples: Submit the number requested in the Specification Section.
   4. Certificates: Will be considered as information. No copy shall be returned.

B. Unless otherwise specified in the Technical Specifications, within 30 days after receipt of each submittal or resubmittal, the submittal or resubmittal will be returned to the Supply Contractor. The returned material will consist of a maximum of three marked-up copies of the submittal. The returned submittal will indicate one of the following actions:
   1. If the review indicates that the submittal is in general conformance with the Contract, the submittal copies shall be marked "No Exceptions Taken" and given a Review Action of "1." In this case, implement the work covered in the submittal.
   2. If the review indicates that the submittal requires limited corrections, the submittal copies will be marked "Note Markings" and given a Review Action of "2." In this case, begin to implement the work covered in the submittal in accordance with the markings noted. Where submittal information is to be incorporated in O&M data, a corrected copy shall be resubmitted; otherwise, no further action is required.
   3. If the review reveals the submittal is insufficient and contains incorrect data and the comments are of a nature that can be confirmed, the submittal copies shall be marked "Comments Attached --Confirm" and given a Review Action of "3". A Review Action "3" does not allow implementation of the work covered by the submittal until the information requested to be confirmed in the submittal has been revised, submitted, and returned to the Supply Contractor with a Review Action of either "1" or "2."
   4. If the review reveals the submittal is insufficient or contains incorrect data and the comments require that the submittal be revised and resubmitted, the submittal copies shall be marked "Comments Attached --Resubmit" and given a Review Action of "4". A Review Action "4" does not allow implementation of the work covered by the submittal until the information in the submittal has been revised, resubmitted, and returned to the Supply Contractor with a Review

Action of either "1" or "2".

5. If the review reveals that the submittal is not in general conformance with the Contract, or if the submittal is incomplete, the submittal copies shall be marked "Rejected" and given a Review Action of "5." Submittals containing deviations or substitutions from Contract which have not been clearly identified by the Supply Contractor fall into this category. A Review Action “5” does not allow implementation of the work covered by the submittal until the information in the submittal has been revised, resubmitted, and returned with a Review Action of either "1" or "2.”

3.04 EFFECT OF REVIEW OF SUBMITTALS

A. Review of submittals shall not relieve the Supply Contractor of its responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the County.

B. Unless identified by the Supply Contractor specifically on the submittal, no disposition of the submittal by the Project Representative changes the requirements of the Specification and Drawings.

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies reference standards abbreviation and other acronyms to assist the Supply Contractor.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or federal standards, comply with requirements of the standard, except when more rigid requirements are required by applicable codes or specified herein.

B. Comply with referenced standards that are current at the date of receipt of bids.

C. The contractual relationship of the Contracted parties shall not be altered by mention or inference otherwise in any reference document.

1.03 REFERENCED STANDARDS

AA	Aluminum Association (www.aluminum.org)
AABC	Associated Air Balance Council (www.aabchq.com)
AAMA	American Architectural Manufacturers Association (www.aamanet.org)
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials (www.asshto.org)
AATCC	American Association of Textile Chemists and Colorists (www.aatcc.org)
ABMA	American Bearing Manufacturers Association (www.abma-dc.org)
ABMA	American Boiler Manufacturers Association (www.abma.com)
ACCA	Air Conditioning Contractors of America (www.acca.org)
ACI	American Concrete Institute (www.aci-int.org)
ACPA	American Concrete Pipe Association (www.concrete-pipe.org)
ACPPA	Asbestos Cement Pipe Producers Association (www.asbestos-institute.ca/pvc.html)
ADC	Air Diffusion Council (www.flexibleduct.org)
AEIC	Association of Edison Illuminating Companies (www.aeic.org)
AGA	American Gas Association (www.aga.org)
AGMA	American Gear Manufacturer's Association (www.agma.org)
AI	Asphalt Institute (www.asphaltinstitute.org)
AISC	American Institute of Steel Construction (www.aisc.org)
AISE	Association of Iron and Steel Engineers (www.aise.org)
AISI	American Iron and Steel Institute (www.steel.org)
AITC	American Institute of Timber Construction (www.aitc-glulam.org)
AMCA	Air Movement and Control Association (www.amca.org)
ANLA	American Nursery and Landscape Association (www.anla.org)
ANSI	American National Standards Institute (www.ansi.org)
APA	The Engineered Wood Association (www.apawood.org)
API	American Petroleum Institute (www.api.org)
APWA	American Public Works Association (www.apwa.net)
AREMA	American Railway Engineering and Maintenance-of-way Association (www.arema.org)
ARI	Air Conditioning and Refrigeration Institute (www.ari.org)
ASA	Acoustical Society of America (asa.aip.org)
ASCE	American Society of Civil Engineers (www.asce.org)
ASE	American Standard Safety Code for Elevators and Escalators

ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers (www.ashrae.org)
ASME	American Society of Mechanical Engineers (www.asme.org)
ASNT	American Society for Nondestructive Testing (www.asnt.org)
ASQ	American Society for Quality (www.asq.org)
ASSE	American Society of Sanitary Engineering (www.asse-plumbing.org)
ASTM	American Society for Testing and Materials (www.astm.org)
AWI	Architectural Woodwork Institute (www.awinet.org)
AWPA	American Wood Preservers Association (www.awpa.com)
AWS	American Welding Society (www.amweld.org)
AWWA	American Water Works Association (www.awwa.org)
BHMA	Builders Hardware Manufacturers Association (www.buildershardware.com)
BIA	Brick Institute of America (www.bia.org)
BOCA	Building Officials and Code Administrators International (www.bocai.org)
BOR	Bureau of Reclamation (www.usbr.gov)
CABO	Council of American Building Officials (www.bocai.org)
CEMA	Conveyor Equipment Manufacturers Association (www.cemanet.org)
CGA	Compressed Gas Association (www.cganet.com)
CI	Chlorine Institute (www.cl2.com)
CISPI	Cast Iron Soil Pipe Institute (www.cispi.org)
CLFMI	Chain Link Fence Manufacturers Institute (www.chainlinkinfo.org)
CMAA	Crane Manufacturers Association of America (www.mhia.org/cmaa)
COE	Corps of Engineers (www.usace.army.mil)
CPSC	Consumer Product Safety Commission (www.cpsc.gov)
CRA	California Redwood Association (www.calredwood.org)
CRD	Corps of Engineers Specification
CRSI	Concrete Reinforcing Steel Institute (www.crsi.org)
CEMA	Conveyor Manufacturers Association (222.cemanet.org)
CRI TM	Carpet and Rug Institute (www.carpet-rug.com)
CSA	Canadian Standards Association (www.csa.ca)
CTI	Cooling Technology Institute (www.cti.org)
CWHSSA	Contract Work Hours & Safety Standards Act
DASMA	Door and Access System Manufacturers Association (www.taol.com/dasma)
DHI	Door and Hardware Institute (www.dhi.org)
DIPRA	Ductile Iron Pipe Research Association (www.dipra.org)
DOE	Department of Ecology (www.ecy.wa.gov)
EEI	Edison Electric Institute (www.eei.org)
EIA	Electronic Industries Association (www.eia.org)
EIMA	EIFS Industry Members Association (www.eifsfacts.com)
EJMA	Expansion Joint Manufacturers Association (www.ejma.org)
EPA	United States Environmental Protection Agency (www.epa.gov)
FS	Federal Specifications (www.fss.gsa.gov/pub/fed-specs.cfm)
FED-STD	Federal Standards (www.fss.gsa.gov/pub/fed-specs.cfm)
FHWA	Federal Highway Administration (www.fhwa.dot.gov)
FM	Factory Mutual Engineering and Research (www.fmglobal.com)
FS	Federal Specifications
FSUP	Forestry Suppliers (www.forestry-suppliers.com)
FCCCHR	Foundation for Cross-Connection Control and Hydraulic Research (www.usc.edu/dept/fccchr/)
GA	Gypsum Association (www.gypsum.org)
GANA	Glass Association of North America (www.glasswebsite.com)
GSI	Geosynthetic Institute (www.geosynthetic-institute.org)
HEI	Heat Exchange Institute (www.heatexchange.org)
HI	Hydraulic Institute (www.pumps.org)
HMI	Hoist Manufacturer's Institute (www.mhia.org)
HPVA	Hardwood Plywood and veneer Association (www.hpva.org)
IAPMO	International Association of Plumbing and Mechanical Officials (www.iapmo.org)
ICBO	International Conference of Building Officials (www.icbo.org)
ICAC	Institute of Clean Air Companies (www.icac.com)
ICEA	Insulated Cable Engineers Association (www.icea.net)

IEC	International Electrotechnical Commission (www.iec.ch)
IEEE	Institute of Electrical and Electronics Engineers (www.ieee.org)
IESNA	Illuminating Engineering Society of North America (www.iesna.org)
IFI	Industrial Fasteners Institute (www.industrial-fasteners.org)
IMSA	International Municipal Signal Association (www.imsasafety.org)
IPC	Institute for Interconnecting and Packaging Electronic Circuits (www.ipc.org)
ISA	Instrument Society of America (www.isa.org)
ISO	International Organization for Standardization (www.iso.ch)
ISS	Iron and Steel Society (www.issource.org)
ISSA	International Slurry Surfacing Association (www.slurry.org)
MBMA	Metal Building Manufacturers Association (www.mbma.com)
MHI	Material Handling Industry (www.mhia.org)
MS	Military Standards (MIL-SPEC) (www.dodssp.daps.mil)
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry (www.mss-hq.com)
MSHA	Mine Safety and Health Administration (www.msha.gov)
MUTCD	Manual of Uniform Traffic Control Devices (www.mutcd.fhwa.dot.gov)
NAAMM	National Association of Architectural Metal Manufacturers (www.naamm.org)
NAIMA	North American Insulation Manufacturers Association (www.naima.org)
NACE	National Association of Corrosion Engineers (www.nace.org)
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors (www.nationalboard.org)
NBS	National Bureau of Standards (now National Institute of Standards and Technology)
NCMA	National Concrete Masonry Association (www.ncma.org)
NDA	National Drilling Association (http://www.nda4u.com)
NEBB	National Environmental Balancing Bureau (www.nebb.org)
NEC	National Electric Code (www.nfpa.org/codes/)
NEMA	National Electrical Manufacturer's Association (www.nema.org)
NESC	National Electric Safety Code (http://standards.ieee.org/faqs/NESCFAQ.html)
NESHAP	National Emission Standards for Hazardous Air Pollutants (http://www.epa.gov/region4/air/asbestos/asbqa.htm)
NFLPA	National Fluid Power Association (www.nfpa.com)
NHLA	National Hardwood Lumber Association (www.natlhardwood.org)
NIOSH	National Institute of Occupational Safety and Health (www.cdc.gov/niosh/homepage.html)
NICET	National Institute of Certification in Engineering Technologies (www.nicet.org)
NIST	National Institute of Standards and Technology (www.nist.gov)
NFPA	National Fluid Power Association (www.nfpa.com)
NFPA	National Forest Products Association (www.forestprod.org)
NFPA	National Fire Protection Association (www.nfpa.org)
NPCA	National Paint and Coatings Association (www.paint.org)
NRCA	National Roofing Contractors Association (www.nrca.net)
NRMCA	National Ready-Mixed Concrete Association (www.nrmca.org)
NTIS	National Technical Information Services (www.ntis.gov)
NWWDA	National Wood Window and Door Association (www.nwwda.org)
OSHA	Occupational Safety and Health Act (www.osha.gov)
PCI	Precast/Prestressed Concrete Institute (www.pci.org)
PDI	Plumbing and Drainage Institute (www.pdionline.org)
PFI	Pipe Fabrication Institute (www.pfi-institute.org)
PPFA	Plastic Pipe and Fittings Association (www.ppfahome.org)
PPI	Plastics Pipe Institute (www.plasticpipe.org)
PPIC	Plumbing and Piping Industry Council
PSCAA	Puget Sound Clean Air Agency ((www.pscleanair.org)
RMA	Rubber Manufacturers Association (www.rma.org)
SAE	Society of Automotive Engineers (www.sae.org)
SAMA	Scientific Apparatus Makers Association Group of Associations
SDI	Steel Deck Institute (www.sdi.org)
SDOI	Steel Door Institute (www.steeldoor.org)
SJI	Steel Joist Institute (www.steeljoist.org)
SMA	Screen Manufacturers Association

SMACNA	Sheet Metal and Air Conditioning Contractors National Association (www.samcna.org)
SPRI	Single Ply Roofing Institute (www.spri.org)
SSPC	Society for Protective Coatings (www.sspc.org)
STI	Steel Tank Institute (www.steeltank.com)
SWI	Steel Window Institute (www.steelwindows.com)
TCA	Tile Council of America (www.tileusa.com)
TEMA	Tubular Exchanger Manufacturer's Association (www.tema.org)
TPI	Truss Plate Institute (www.tpinst.org)
UBC	Uniform Building Code (Published by ICBO)
UBPPA	Uni-bell PVC Pipe Association (www.uni-bell.org)
UL	Underwriters Laboratories (www.ul.com)
UMC	Uniform Mechanical Code (Published by ICBO)
UPC	Uniform Plumbing Code (Published by IAPMO)
USBR	Bureau of Reclamation, U.S. Department of Interior (www.usbr.gov)
WAC	Washington Administrative Code (www.mrsc.org/wac.htm)
WCLIB	West Coast lumber Inspection Bureau (www.wclib.org)
WDOE	Washington Department of Ecology (www.wa.gov/ecology/)
WEF	Water Environment Federation
WISHA	Washington Industrial Safety and Health Act (www.lni.wa.gov/wisha/)
WQA	Water Quality Association
WSDOT-APWA	Washington State Dept. of Transportation and American Public Works Association, Standard Specifications for Road, Bridge, and Municipal Construction
WWPA	Western Wood Products Association (www.wwpa.org)
WWPI	Western Wood Preservers Institute (www.wwpinstitute.org)
WAQTC	Western Alliance for Quality Transportation Construction (www.waqtc.org)

1.04 ACRONYMS

A. In addition to the above listings, wherever used in the Contract Documents, the following acronyms will have the meaning listed:
   1. APP Accident Prevention Program
   2. BMP Best Management Practice.
   3. CFR Code of Federal regulations
   4. HASP Contractor's Site Specific Health and Safety Plan
   5. NTP Notice to Proceed.
   6. WTD Wastewater Treatment Division.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01063

HEALTH AND SAFETY

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies procedures for complying with applicable laws and regulations related to worker safety and health. It is not the intent of the County to develop, manage, direct, and/or administer the safety and health programs of contractors or in any way assume the responsibility for the safety and health of their employees. It is required that the Supply Contractor adheres to applicable federal, state and local safety and health standards.

B. This Section describes the requirements for submittal of the Supply Contractor's Site Specific Health and Safety Plan (HASP).

C. It is not the intent of the County Wastewater Treatment Division (WTD) to list and identify all applicable safety codes, standards, and/or regulations requiring compliance by all Supply Contractor and subcontractor groups. Supply Contractor and subcontractors shall be solely responsible for identifying and determining all safety codes, standards, and regulations which are applicable to the work.

D. Supply Contractor and subcontractors are encouraged to use the consulting services of the State of Washington's Department of Labor and Industries WISHA Consulting Section at (206) 281-5470, for assistance with the requirements of this Section.

E. The HASP submittal shall be accepted and implementable per Section 01300 requirements prior to the start of site work.

G. All work required in the Contract shall meet the requirements in RCW 49.17 and 29 CFR 1926 and be considered in the bid amount per RCW 39.04.180.

1.02 QUALITY ASSURANCE

A. Referenced Standards: This Section incorporates by reference the latest revision of the following document. It is a part of this Section as specified and modified. In case of conflict between the requirements of this Section and that of the listed document, the requirements of this Section shall prevail.

Reference	Title
29 USC 651 et seq.	Federal Occupational Safety and Health Act
29 CFR 1910.146	Permit Required Confined Spaces
29 CFR 1910.147	Control of Hazardous Energy (lockout/tagout)
29 CFR 1926	Safety and Health Regulations for Construction
Chapter 296-24 WAC	WISHA General Safety and Health Standards
Chapter 296-37 WAC	WISHA Safety Standards for Commercial Diving
Chapter 296-45 WAC	WISHA Electrical Workers Safety Rules
Chapter 296-62 WAC	WISHA General Occupational Health Standards
Chapter 296-67 WAC	WISHA Process Safety Management Standards
Chapter 296-155 WAC	WISHA Safety Standards for Construction Work
Chapter 296-800 WAC	Safety and Health Core Rules
RCW 49.17	Washington Industrial Safety and Health Act (WISHA)
RCW 39.04.180	Trench Safety Systems, Safety Systems Required
WAC 296-800-110	Employer responsibilities: Safe workplace -- Summary

1.03 SUBMITTALS

A. Procedures: Section 01300.

B. HASP:
   1. Submit Supply Contractor HASP for all Contract work for review and disposition.
   2. After submittal receives a disposition allowing implementation, submit three copies.

C. APP: Provide four copies within five days of the effective date of the NTP.

D. Revised APP and HASP accommodating changes requested by the Project Representative and/or regulatory agencies or jurisdiction per Paragraph 01063-3.02. Provide four copies.

E. Incident Report(s): Provide four copies.

F. Minutes and list of attendees of the pre-job safety meeting: Provide four copies within three days of the meeting.

G. Minutes and list of attendees of weekly safety tailgate meeting: Provide four copies within three days of the meeting.

H. Monthly Supply Contractor Injury Summary Report: provide four copies each month on Form 01063-A received from Project Representative within ten days of the end of each month.

I. Notice and listing of flammable liquids and liquefied petroleum gases when planned to be used on the work site.

1.04 SUPPLY CONTRACTOR QUALITY ASSURANCE

A. Review the entire scope of work, the work site location, adjacent structures and systems, and applicable Contract requirements to ensure, by personal review and examination, and by such other means as appropriate, the safety considerations and requirements that shall be addressed and planned prior to the start of work.

B. Ensure that Supply Contractor's employees and the subcontractor's employees comply with the APP and HASP.

C. Designate a health and safety supervisor on site with appropriate training, responsibility and full authority to coordinate, implement, and enforce the Supply Contractor's APP and HASP for the duration of this Contract. The name and telephone number of the health and safety supervisor and alternate shall appear in the APP and HASP.

D. Ensure that safe work principles and practices are followed in completing work tasks.

1.05 HASP

A. A comprehensive HASP covers all aspects of the Supply Contractor's work activities related specifically and distinctly to the work and site conditions. The HASP shall be based on a site specific hazard analysis and shall explain how the APP elements and any Contract specific safety procedures shall be applied to the identified hazards in the work.

B. HASP organization: organized and bound to readily accept revisions and additions.
   1. Outline form.
   2. Table of contents.

C. The following subparagraphs describe certain minimum precautions for consideration in developing an APP and HASP. Include in the HASP all of the items below which may apply to the work. There may be other items not noted below which the Supply Contractor shall address in the HASP. Items below which are not needed, note in the HASP as not applicable.
   1. Hazard Communication (WAC 296-62 Part C):

a. Contaminant gases that may be encountered include, but are not limited to, hydrogen sulfide, methane, carbon monoxide, carbon dioxide and sulfur dioxide.
b. Provide a written Hazard Communication Program and emergency management plan addressing these and other potential hazardous substances that may exist and/or be brought on site during the work.
c. For work requiring the use of hazardous materials and chemicals, provide a list and corresponding Material Safety Data Sheets (MSDS) for hazardous chemicals to be used on site. If no hazardous chemicals are to be used, provide statement to that effect.

2. Confined Space (WAC 296-62 Part M):
   a. The nature of the work may expose workers to permit-required confined spaces having possible explosive, toxic and oxygen deficient atmospheric conditions.
   b. Prior to execution of work in confined spaces. Provide a written Permit Required Confined Space Safety Program that meets the requirements of 29 CFR 1910.146 and WAC 296-62 Part M.
3. Hazardous Energy Control:
   a. The nature of the work may expose workers to hazardous energy sources that include, but are not limited to, electrical, mechanical, pneumatic, hydraulic, thermal, and computerized systems. Provide a written plan outlining safe work practices addressing hazardous energy control procedures that meet the requirements of 29 CFR 1910.147 and WAC 296-24 Part A-4.
   b. Lockout/Tagout (WAC 296-24 Part A-4):
      1) In the written plan outlined above, address the Lockout/Tagout procedures that meet the requirements of 29 CFR 1910.147 and WAC 296-24 Part A-4. The written plan is to be coordinated and be compatible with the County's existing program for Lockout/Tagout.
4. Fall Prevention and Protection (WAC 296-24 Part J-1) and WAC 296-155 Part C-1):
   a. The nature of the work may expose workers to fall hazards.
   b. Provide a written Fall Prevention and Protection plan outlining safe work practices addressing fall hazards that meet the requirements of WAC 296-24 Part J-1 and WAC 296-155 Part C-1.
5. Personal Protective Equipment (WAC 296-24 Part A-2):
   a. The nature of the work may expose workers to miscellaneous injury hazards to the head, hands, feet, body, eyes, ears, etc.
   b. Provide a written Personal Protective Equipment (PPE) plan outlining safe work practices addressing the use of personal protective equipment and clothing that meet the requirements of WAC 296-24 Part A-2.
6. Underground Construction (WAC 296-155 Part Q):
   a. Provide a written program detailing how employees and County staff on the site will be protected from the dangers of underground construction. As a minimum, the program shall include the following where applicable to the work:

Air Monitoring	Emergency Procedures, including evacuation procedures and Check-in/check-out systems
Ventilation	Hazardous classification
Illumination	Haulage
Communications	Electrical safety
Flood control	Hoisting
Mechanical equipment	Designated person
PPE	Emergency lighting
Use of explosives	Ground support
Fire prevention and protection	Pneumatic and hydraulic safety
Access and egress	Rescue

7. Biological Agents (WAC 296-62 Part J):
   a. Wastewater systems carry a wide spectrum of disease-producing organisms.
   b. Provide a written hazard communication and biological/bloodborne pathogen program detailing the preventive measures to be taken to provide an appropriate work environment for all site employees as well as County staff on site. These may include, but are not limited to, the following:
      1) Instruction in appropriate measures to avoid contamination.
      2) A preventative inoculation program (tetanus/diphtheria, etc.) available to all employees.

3) Personal protective equipment and clothing to protect against infection, including rubber boots with full sole and heel steel insert-liners, safety glasses or goggles, and gloves.
4) Facilities for workers to clean up, wash, and maintain good personal hygiene practices.

8. Process Safety Management (Chapter 296-67 WAC):
   a. The County uses chlorine (as a disinfectant), sulfur dioxide (for dechlorination) and propane, and generates digester gas (methane) at the wastewater treatment plants. Chlorine and sulfur dioxide in small concentrations can cause irritation or burning of skin, coughing, pulmonary edema, and inflammation of the respiratory tract; in greater concentrations, they can cause cardiac complications.
   b. At a minimum, provide a written Hazard Communication Program detailing the preventive measures to be taken to provide an appropriate work environment for its employees as well as County staff on site. Where Supply Contractor's work involves modifications to the chlorine, sulfur dioxide, propane, and/or digester gas systems, provide a detailed Management of Change (WAC 296-67-045).

9. Hot Work and Hot Work Permits (HWP):
   a. Identifies any type of work that produces a possible source of ignition in the presence of a fuel and oxygen (Fire Triangle) including, but will not be limited to, sparks, static electricity, welding, torch cutting, flame heating, brazing, grinding, sanding, and drilling. These activities are considered to be extremely dangerous in areas where the potential for an Lower Explosive Limit (LEL) above 10% or oxygen enriched atmosphere could be encountered and/or where the hot work would be in close proximity to combustibles or flammables. Permit-required confined spaces, underground construction, plant areas, and systems covered under Process Safety Management (PSM) requirements and/or other applicable system areas where the mixture of an ignition source, fuel and oxygen is possible, require HWPs to be used when hot work is performed in these areas.
   b. HWPs: utilized in all WTD facilities and construction sites where the potential for the ignition of explosive gases, liquids and/or flammable/ combustible materials or oxygen enriched atmospheres may potentially exist.
   c. HWPs required for areas that are classified per the WAC and NFPA 820, as applicable.
      1) Permit-Required Confined Spaces.
      2) Process Safety Management System Areas.
      3) Class 1 Division 1/Division 2 hazardous locations.
      4) All other areas where the hot work would be in close proximity to combustibles or flammables.
   d. WTD HWP: obtained from the County prior to the start of all Hot Work in County facilities. The HWP provides written authorization to perform Hot Work operations and establishes conditions necessary to perform these operations. Request a WTD HWP from the Project representative a minimum seven days prior to use.
   e. Supply Contractor HWP: for all sites under Supply Contractor control. Annotate how Supply Contractor HWP is established and employ a system for issuing HWPs and monitoring their use.
   f. HWPs are valid only for the parties performing the work, the work shift during which the work is conducted, and only for the conditions observed and evaluated when the permit is issued.
10. Suspect Material:
    a. Promptly suspend work and notify the Project Representative of unusual conditions, including oily soil found on work site. Work shall remain suspended until authorized in writing by the Project Representative to resume.
11. Commercial Diving Operations (Chapter 296-37 WAC):
    a. Due to the hazards associated with commercial diving operations conducted within wastewater collection, conveyance and treatment facility systems, specific safety protocols and procedures are required to ensure worker and diver safety.
    b. Provide a comprehensive Safe Practices Manual for Diving Operations which complies with Chapter 296-37 WAC.
12. Undeterminable Injuries:
    a. Certain types of incidents may result in injuries to an employee that are not immediately apparent, but which could impair the employee's ability to perform work safely. Describe your procedure for determining if an employee with an undeterminable injury may safely work on the work site.

13. Flammable Liquids and Liquified Petroleum Gases (LPG):
    a. No propane, propylene, butane, isobutane, and butylenes shall be stored inside buildings.
    b. Provide a written listing of each of the materials listed in Paragraph 01063-1.05C.13a planned to be used on site.
    c. When materials listed in Paragraph 01063-1.05C.13a are to be used on the work site, submit listing of the materials and notice prior to arrival on the work site.

1.06 UTILITIES

A. During the performance of the work, take appropriate precautions when working near, around, and/or with utilities and dangerous substances, in order to protect the health and safety of the worker, the public, property, and the environment.

B. Provide a flagged warning line for all work conducted in proximity to power lines. Coordinate with utility owner for this work.

C. Coordinate with the utility owner and the Project Representative to obtain approval to disconnect or reconnect utilities.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 SAFETY AND HEALTH COMPLIANCE

A. The Project Representative reserves the right to audit the Supply Contractor's APP and implementation of HASP. The Project Representative reserves the right to stop that portion of the Supply Contractor's work that is determined to be an imminent or immediate threat to worker health or safety. Ongoing work and hazardous situations that are considered a safety or health risk by the Project Representative shall be corrected immediately.

B. Ensure that necessary air monitoring, ventilation equipment, protective clothing, hazardous energy control devices, fall prevention and other specified supplies and equipment are made readily available to employees to facilitate implementation of the APP and the HASP.

C. All County facility entry protocols shall be followed. Enter all County facilities in teams of two or more. With written approval of the Project Representative, Supply Contractor employees may enter alone only for short-term walk through inspections that do not involve working on ladders, with electrical equipment, or entering confined spaces. Any work beyond short term work which involves Supply Contractor employees working alone requires written approval of the Project Representative.

D. Notify the Project Representative immediately of all incidents involving personal injury and/or property damage. Provide a written report known as the Incident Report within 24 hours of any incident. Report for each incident occurrence shall include:
    1. Description of event.
    2. Names of personnel involved.
    3. Description of injuries and treatment required (short term and long term).
    4. Description of property damage.
    5. Site visits and inspections of other agencies as a result of an incident. Include names of the persons, purpose of the visit, and any other pertinent information.

E. Conduct a pre-job safety meeting with Supply Contractor staff and with all subcontractor staff. Submit list of attendees and minutes of pre-job safety meeting.

F. Conduct all weekly safety tailgate meetings. Submit list of attendees and minutes of weekly safety tailgate meetings.

G. Submit a Monthly Supply Contractor Injury Report on Form 01063-A to be provided by the County consisting of a summary of the current month's injury accidents.

H. Use of intoxicants or of illegal or debilitating drugs while working on a County contract is prohibited.

I. Failure to comply with safety and health regulations will result in work suspension until adequate safety and health measures are implemented.

3.02 SITE SPECIFIC HEALTH AND SAFETY PLAN REVISIONS

A. In the event that the Project Representative, regulatory agencies, or jurisdictions determine that the HASP or associated documents, or organizational structure to be inadequate to protect employees and the public:
   1. Modify the APP and HASP to meet the requirements of said regulatory agencies, jurisdictions, and/or the Project Representative.
   2. Provide submittal for revisions to the APP and HASP within 7 days of the notice of requirement for modification.
   3. The revision shall be approved by the Project Representative prior to changing work practices.

3.03 POSTING

A. Provide and maintain a copy of the accepted APP and the HASP at the Supply Contractor's job site office and at each of the subcontractors' offices.

3.04 COMPLIANCE

A. Failure to comply with this Section will result in work suspension until adequate safety and health measures are implemented.

END OF SECTION

SECTION 01031

SEISMIC ANCHORAGE AND BRACING

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies the seismic anchorage and bracing for equipment.

1.02 QUALITY ASSURANCE

A. Reference Standards: This Section incorporates by reference the latest revisions of the following documents. They are a part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

Reference	Title
UBC	Uniform Building Code

1.03 SUBMITTALS

A. Procedures: Section 01300.

B. List of equipment weighing 400 pounds or more.

C. No less than four weeks in advance of equipment installation, submit anchorage and bracing drawings and calculations bearing the stamp of the engineer. Drawings and calculations shall include and clearly show the criteria used to determine seismic coefficients and forces applied to the equipment, including seismic zone, soil profile type, and importance factors.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

A. In accordance with UBC Section 1632, equipment weighing 400 pounds or more shall be anchored and braced to resist seismic forces. Seismic anchorage and bracing shall be designed by a State of Washington Registered Structural Engineer using the site-specific seismic criteria listed in Paragraph 01031-1.05.

1.05 SITE SEISMIC CRITERIA (UBC)

A. Seismic Zone: 3

B. Importance Factors
   1. I = 1.25
   2. Ip = 1.50

C. Soil Profile Type: S_E

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01014

WORK SEQUENCE

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies Contract Time, work sequence, milestones, constraints, limitations, and liquidated damages.

B. The Supply Contractor shall schedule and conduct work in a manner consistent with the limitations in this Section, and comply with the schedule, the specific sequence, constraints, milestones and limitations of work specified.

C. Sequence of work
   1. Plan the sequence of work to accommodate all the requirements of the specifications.

   2. The Contract Price shall include all specified requirements as described in this Section.

1.02 COMPLETION TIMES

A. Complete the work within the Milestones shown in Section 01014 1.04 A. below. Failure to complete the work within the calendar days specified will result in Liquidated Damages being assessed against the Supply Contractor in accordance with Section 4-9 and this Section.

1.03 LIMITATIONS

A. The preliminary submittal for the work shall be delivered early in the project as scheduled below. This will allow engineering to proceed.

B. Manufacturing shall not begin until after the final submittal is reviewed by the County and returned to the Supply Contractor with a Review Action of 1 or 2 in accordance with Section 01300.

1.04 PRELIMINARY CONTRACT MILESTONES

A. Time is of the essence in this contract. The Contractor will be held in strict compliance with the MIlestones set forth in these specifications. For each and every day that satisfactory completion of each Milestone is delayed beyond the specified Completion Date, the County will suffer damages.

Description of Work/Milestone	Completion Date
Preliminary Submittal	Within 45 Days Following NTP
Equipment Available for Delivery at the West Point project site	October 1, 2005
Emissions Testing Successfully Completed	Within 20 days following completion of Performance Testing (see paragraph 1.05 B in this Section 01014)
Final Acceptance	Within 90 days following completion of Emissions Testing

B. Within the specification requirements, it shall be the Supply Contractor's responsibility to meet the above schedule.

1.05 CONSTRAINTS:

A. The Supply Contractor shall notify the Project Representative before arriving on the site. The Supply Contractor shall comply with all site regulations and safety requirements as well as the Installation

Contractor's safety requirements.

B. The following dates are estimated earliest dates that the installing contractor's work will proceed. The County in no way guarantees that the work will be accomplished by these dates, and no additional compensation will be provided to the Supply Contractor for delays beyond these dates:

Description of Work	Earliest Date
Notice to Deliver (see Section 1600)	October 1, 2005
Installation Begins	October 22, 2005
Pretest Preparation Begins	January 1, 2006
Functional Testing Begins	February 1, 2006
Performance Testing Begins	March 1, 2006
Operational Testing Begins	April 1, 2006
Commissioning Begins	April 15, 2006
Contract Substantial Completion	July 1, 2006
Final Acceptance	July 15, 2006

END OF SECTION

FORM 01011-B: Materials and/or Equipment Inspection and Responsibility Transfer Form

Contractor: _____ Subcontractor: _____
Contract Number: _____ Contract Name: _____
Project Representative: _____ _____ Vendor: _____
Description: _____ Contact Person: _____
Delivery Group: _____ Contractor Availability Date: _____
Description: _____ Final Transfer Date: _____

This is to certify that the Contractor, King County and the Vendor have jointly inspected the below described materials and/or equipment and have not observed any physical damage except as noted.

_____

_____

_____

Date of Delivery: _____ Time: _____

Signing this document transfers responsibility from the County to the installing Contractor. From this date on, the installing Contractor is responsible for these materials and/or equipment as if they were purchased by the Contractor. Signing of this form by the Supply Contractor does not relieve the Supply Contractor of any or all of its contractual obligations to fulfill its contract with the County.

Signatures:

Contractor_____ Title_____ Date_____ Quantity Verification (Initial _____

Subcontractor_____ Title_____ Date_____ Quantity Verification (Initial _____

King County_____ Title_____ Date_____ Quantity Verification (Initial _____

Supply Contractor_____ Title_____ Date_____ Quantity Verification (Initial _____

County Equip/Tag #	QTY ORDER	QTY RECEIVED	Unit/ Matl.	BOX #	DRAWING #	VENDOR'S #	DESCRIPTION	TRUCK

COMMENTS:

SECTION 01750

SPARE PARTS

PART 1 GENERAL

1.01 SUMMARY

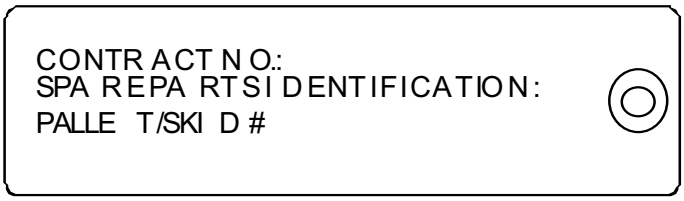
A This Section summarizes the requirements for turnover of spare parts listed in Division 2 through Division 17. More specific information pertaining to types and quantities of the spare parts is provided in the individual Sections.

B. All the following sections contain requirements for spare parts.
   1. 11093

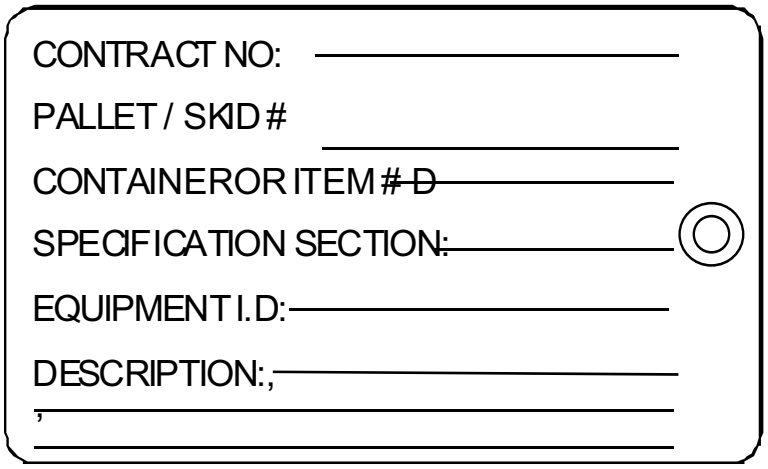
1.02 STORAGE

A. Until turnover required by Paragraph 01750-3.01, be responsible for the delivery, storage, and protection of spare parts and equipment required in accordance with manufacturer recommendations.

B. Store on pallets or shipping skids, and identify as follows:
   1. The pallets or skids shall be sequentially numbered, by Contract number. Each pallet or skid shall have a single, unique numerical designation. (Example):



   2. Items or containers on each skid shall be alphabetically ordered and identified by a tag with the following information. The containers or items on each pallet or skid shall always begin with "A", and proceed in alphabetical order. (Example: If pallet #007 has five items on it, the items would be individually tagged and identified as 007-A, 007-B, 007-C, 007-D, and 007-E.)



   3. The information recorded on the tags shall be in the same order in which the spare parts are turned over. Any reorganization of parts or containers on pallets must be reflected in accurate identification tags. Pallets, parts, or equipment with inaccurate, incomplete, or missing tags, will not be accepted.

4. Spare parts subject to deterioration such as ferrous metal items and electrical components shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping. The quality of protection shall be equal to that required for shipment overseas and storage in humid, tropical climates.
5. Those spare parts with individual weights less than 50 pounds and dimensions less than 2'-0" W x 1'-6" H x 3'-0" L shall be stored in a heavy wooden boxes, with a hinged wooden cover. The hinges shall be heavy-duty strap types. Paint and identify boxes with stenciled lettering indicating "Spare Parts". A neatly typed inventory of the parts contained within shall be taped inside in a heavy-duty plastic protective sleeve to the underside of the cover. The boxes shall be identified as per Paragraph 01750-1.02B.2, and the parts description shall reference the typed inventory list taped to the cover.
6. Provide access to spare parts for inspection while in storage.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 TURNOVER OF THE SPARE PARTS

A. Provide 2 weeks written advance notification of intent to turn over all spare parts. The written notification shall be accompanied by a completed Spare Parts Release Form 01750-A as provided by the Project Representative.

B. Provide for the delivery and off-loading of spare parts at a County location, as determined by the Project Representative.

C. Jointly inspect spare parts with the Project Representative and verify condition and quantities. Mutual agreement and signoff on the Spare Parts Release Form shall constitute turnover of the spare parts.

D. The spare parts may be delivered only upon completion of the operational testing phase of the work, and prior to issuance of Substantial Completion. The only exception shall be the acceptance of spare parts for that portion of the work accepted for Possession and Use prior to issuance of Substantial Completion.

3.02 DOCUMENTATION

A. Turn over five copies of the Spare Parts Release Form to the Project Representative with the spare parts.

B. Include the Spare Parts Release Form in the final bound operations and maintenance (O&M) manual. Include mention of the Spare Parts Release Form in the Table of Contents.

END OF SECTION

SECTION 11000

GENERAL REQUIREMENTS FOR EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies general requirements which are applicable to all mechanical equipment (electrical equipment provided with mechanical equipment) and also specify general requirements for mechanical equipment. Be responsible for ensuring that all mechanical equipment meets the requirements of the applicable sections in addition to the specific requirements of the individual equipment Specification Section.
   1. Equipment under this division includes providing and testing the equipment described in the sections listed on the Division 11, 16, and 17 index sheets.

B. Related Sections: The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to the proper performance of this work. It is the Supply Contractor's responsibility to perform all the work required by the Contract Documents.

C. Equipment lists presented in the Specifications and the Drawings are not warranted to represent a complete listing of all equipment, devices and material to be provided.

1.02 QUALITY ASSURANCE

A. Referenced Standards: This Section incorporates by reference the latest revision of the following document. It is a part of this Section as specified and modified. In case of conflict between the requirements of this Section and that of the listed document, the requirements of this Section shall prevail.

Reference	Title
ABMA 9	Load Ratings and Fatigue Life for Ball Bearings
ABMA 11	Load Ratings and Fatigue Life for Roll Bearings
ASME B1.1	Unified Inch Screw Threads
ASME B1.20.1	Pipe Threads, General Purpose
ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
ASME B18.2.1	Square and Hex Bolts and Screws
ASME B18.2.2	Square and Hex Nuts
NEC	National Electrical Code (NFPA 70)
UBC	Uniform Building Code
UFC	Uniform Fire Code
UL 508	Industrial Control Equipment
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code

B. Arrangement: The arrangement of equipment shown on the Drawings is based upon information available at the time of design and is not intended to show exact dimensions for a specific manufacturer. The Drawings are, in part, diagrammatic, and some features of the illustrated equipment installation may require revision to meet actual equipment installation requirements. Structural supports, foundations, connected piping and valves, electrical and instrument equipment connections shown may have to be altered to accommodate the equipment provided. No additional payment will be made for such revisions and alterations. Substantiating calculations and drawings shall be submitted prior to beginning the work.

C. Unit Responsibility:
   1. Equipment systems made up of two or more components shall be manufactured and assembled as a unit by the responsible manufacturer. The responsible manufacturer shall select all components of the system to assure compatibility, ease of construction and efficient

maintenance. The responsible manufacturer shall coordinate selection and design of all system components such that all equipment furnished under the specification for the equipment system, including equipment specified elsewhere but referenced in the specification, is compatible and operates properly to achieve the performance requirements specified. Unless otherwise specified, the responsible manufacturer shall be the manufacturer of the driven equipment. Agents, representatives or other entities who are not a direct component of the manufacturing corporation will not be acceptable as a substitute for the manufacturer's corporation in meeting this requirement. This requirement for unit responsibility shall in no way relieve the Supply Contractor of his responsibility to the Owner for performance of all systems as provided in the Request for Proposal documents.

2. The Supply Contractor shall assure that all equipment systems provided for the project are products for which unit responsibility has been accepted by the responsible manufacturer. Where the detailed specification requires the Supply Contractor to furnish a certificate from the Unit Responsibility Manufacturer, such certificates shall conform to the content, form and style of Form 11000-C to be provided by the Project Representative, shall be signed by an officer of the manufacturer's corporation and shall be notarized. No other submittal material will be processed until a Certificate of Unit Responsibility has been received and has been found to be satisfactory. Failure to provide acceptable proof that the unit responsibility requirement has been satisfied will result in withholding approval of progress payments for the subject equipment even though the equipment may have been installed in the work.

D. Balance:

1. Unless specified otherwise, all rotating elements in motors, pumps, blowers and centrifugal compressors shall be fully assembled, including coupling hubs, before being statically and dynamically balanced. All rotating elements shall be balanced to the following criteria:

$$e = 16\ W/N$$

Where:

e	=	imbalance, ounce-inches, maximum.
W	=	weight of the balanced assembly, pounds mass
N	=	maximum operational speed, rpm

2. Where specified, balancing reports, demonstrating compliance with this requirement, shall be submitted as product data.

1.03 SUBMITTALS

A. Procedures: Section 01300.

B. Submittals shall be made as specified for each equipment item or group of related equipment items. Identify the equipment by the number listed in the Specification section, by manufacturer and by type designation.

1.04 PROTECTION DURING SHIPMENT AND STORAGE

A. General: Unless otherwise specified in the specific Section for the equipment, this paragraph applies.

B. Shipping:

1. Equipment shall be shipped in sealed, weather-tight, enclosed conveyances and protected against damaging stresses during transport.
2. Bearing housings shall be wrapped or otherwise sealed to prevent contamination by grit and dirt, and ventilation and other types of openings shall be taped closed.
3. Damage shall be corrected to conform to the Contract requirements before the assembly is incorporated into the work.

C. Factory applied coatings: Each item of equipment shall be shipped to the site of the work with the manufacturer's shop coating.

1.06 SEISMIC REQUIREMENTS

A. Anchor and brace equipment in accordance with Section 01031.

1.07 ELECTRICAL REQUIREMENTS

A. Starters: Except for starters specifically included in Division 16, furnish all starters for motors in this Division.

B. Disconnects: Except for factory-supplied disconnects mounted on mechanical equipment or in combination starters, motor disconnects are specified in Division 16.

C. Power and control wiring: Except for factory wiring on mechanical equipment, power and control wiring are specified in Division 16.

D. Provide controls, controllers, transformers, and switches required by the work of Division 16.

E. Factory-wired assemblies and panels shall be prewired to numbered terminal strips for connection to field wiring.

F. Provide disconnect switch for each control circuit connection to prewired assemblies and control panels.

G. Provide approved wiring diagrams for work in Division 16.

H. Provide weatherproof devices and installations for outdoor applications or as specified in Division I6.

I. Install wiring as specified in Division 16.

J. Equipment devices and wiring shall comply with NEC.

PART 2 PRODUCTS

2.01 FLANGES AND PIPE THREADS

A. Unless otherwise noted, all flanges on equipment and appurtenances shall conform in dimensions and drilling to ASME B16.1, Class 125.

B. Flange assembly bolts shall be heavy pattern, hexagonal head, carbon steel machine bolts with heavy pattern, hot pressed, hexagonal nuts conforming to ASME B18.2.1 and B18.2.2. Threads shall be Unified Screw Threads, Standard Coarse Thread Series, Class 2A and 2B, ASME B1.1.

C. All pipe threads shall conform in dimension and limits of size to ASME B1.20.1, Class 2 NPT, Taper Pipe Thread.

2.02 BEARINGS

A. Unless otherwise specified, equipment bearings shall be oil or grease lubricated, ball or roller type, designed to withstand the stresses of the service specified. Each bearing shall be rated in accordance with the latest revisions of ABMA 9 and ABMA 11. Unless otherwise specified, equipment bearings shall have a minimum L-10 rating life of 50,000 hours. The rating life shall be determined using the maximum equipment operating speed.

B. Grease lubricated bearings, except those specified to be factory sealed and lubricated, shall be fitted with easily accessible grease supply, flush, drain and relief fittings. Extension tubes shall be used when necessary. Grease supply fittings shall be standard hydraulic alemite type.

C. Oil lubricated bearings shall be equipped with either a pressure lubricating system or a separate oil reservoir type system. Each oil lubrication system shall be of sufficient size to safely absorb the heat energy normally generated in the bearing under a maximum ambient temperature of 60 degrees C and shall be equipped with a filler pipe and an external level indicator gage.

2.03 V-BELT ASSEMBLIES

A. V-belt assemblies shall be Dodge Dyna-V belts with matching Dyna-V sheaves and Dodge Taper-lock bushings, Wood's Super V-belts with matching Sure-Grip sheaves and Wood's Sure-Grip bushings, or approved equal.

B. Where stationary control variable pitch sheaves are specified, they shall be dry lubricated, and shall have locking collars to clamp all movable parts securely in place to eliminate relative motion between sheave parts. The sheaves shall be adjustable only when the unit is stopped and the sheaves are unloaded.

C. Sheaves and bushings shall be statically balanced. Additionally, sheaves and bushings which operate at a peripheral speed of more than 5,500 feet per minute shall be dynamically balanced. Sheaves shall be separately mounted on their bushings by means of 3 pull-up grab or cap tightening screws. Bushings shall be key seated to the drive shaft.

D. Belts shall be selected for not less than 150 percent of rated driver horsepower and, where two sheaves sized are specified, shall be capable of operating with either set of sheaves. Belts shall be of the anti-static type where explosion-proof equipment is specified. Multiple belts shall be in matched sets.

2.04 SEALS

A. General: Seals for water and wastewater pump shafts shall be either mechanical seals or packing. Unless specified otherwise, mechanical seals and packing shall conform to the requirements set forth in this paragraph.

B. Mechanical Seals
   1. Mechanical seals shall be provided for rotating shafts where specified. Seal shall be factory installed, and shall be internal, single seal, split for removal without disassembly of the pump. Balanced seals shall be provided when operating pressure, shaft size and operating speed dictate this requirement.
   2. All components of the seal shall be split in half including the Elastomer, gland, rotary and stationary seal faces and rotary holder. The non-shaft Elastomer shall incorporate a ball and socket to ease installation.
   3. The seal shall provide positive sealing under system surge pressure (1.5 times operating head) and momentary vacuum up to 25 inches of mercury.
   4. The stationary seal face shall be multiple spring to maintain the sealing function. The spring system shall be isolated from the pumpage to eliminate corrosion and clogging.
   5. The seal shall be installed over a stainless steel shaft sleeve. The shaft sleeve shall be alloyed per the pump section specification without heat treatment so set screws can properly anchor. The seal gland shall be a universal adjustable gland drilled with two standard NPT flushing connections.
   6. The bottom of the stuffing box shall contain a split throttle bushing, running with close clearances to the shaft sleeve to reduce seal water flow and contamination in the stuffingbox from pumpage.
   7. Materials of construction:

Component	Material
Gland and rotary holder	316 Stainless Steel
Springs	Elgiloy or Hastelloy C
Rotary Seal Face	Unfilled pure carbon or Silicon Carbide
Stationary Seal Face	Solid Silicon Carbide
Elastomer	Viton

8. Chesterton 442 with spiral track or approved equal.

C. Packing: Unless otherwise specified, rotating shafts shall be provided with stuffing boxes and shaft packing. Stuffing boxes shall be tapped to permit introduction of seal liquid and shall hold a minimum of five rows of packing and a bronze lantern ring. Packing shall be die-molded packing rings of material suitable for the intended service and as recommended by the manufacturer. Lantern rings shall be of 2-piece construction and shall be provided with tapped holes to facilitate removal.

2.05 COUPLINGS

A. Unless otherwise specified in the particular equipment sections, equipment with a driver greater than 1/2-HP, and where the input shaft of a driven unit is directly connected to the output shaft of the driver, shall have its 2 shafts connected by a flexible coupling which can accommodate angular misalignment, parallel misalignment and end float, and which cushions shock loads and dampens torsional vibrations. The flexible member shall consist of a tire with synthetic tension members bonded together in rubber. The flexible member shall be attached to flanges by means of clamping rings and cap screws, and the flanges shall be attached to the stub shaft by means of taperlock bushings which shall give the equivalent of a shrunk-on fit. There shall be no metal-to-metal contact between the driver and the driven unit. Each coupling shall be sized and provided as recommended by the coupling manufacturer for the specific application, considering horsepower, speed of rotation, and type of service.

B. Where torque or horsepower capacities of couplings of the foregoing type is exceeded, Thomas-Rex, Falk Steel Flex, or approved equal, couplings will be acceptable, provided they are sized in accordance with the equipment manufacturer's recommendations and sizing data are submitted. Install in conformance to the coupling manufacturer's instructions.

2.06 GUARDS

A. Exposed moving parts shall be provided with guards which meet the requirements of WISHA. Guards shall be fabricated of flattened expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be designed to be readily removable to facilitate maintenance of moving parts. Reinforced holes shall be provided. Provisions shall be made to extend lube fittings through guards.

B. Unless otherwise specified, guard materials shall be:
   1. Class 1, Div 1 or 2 areas: Aluminum, 5005-H34, 3/4-.125
   2. Corrosive atmosphere areas: Stainless steel, Type 304, 3/4-13
   3. All other areas: Steel, 3/4-13

2.07 CAUTION SIGNS

A. Equipment with guarded moving parts which operate automatically or by remote control shall be identified by signs reading "CAUTION - AUTOMATIC EQUIPMENT MAY START AT ANY TIME". Signs shall be constructed of fiberglass material, minimum 1/8 inch thick, rigid, suitable for post or wall mounting. Letters shall be white on a red background. The sign size and pattern shall be as shown on the drawings. Signs shall be installed near guarded moving parts.

B. Electrical equipment warnings signs related to the switch gears in Division 16 shall conform to NEC requirements

2.08 GAGE TAPS, TEST PLUGS, DRAINS, AND GAGES

A. Unless otherwise specified, 1/2-inch threaded pressure taps with full port ball valve isolation cocks shall be provided on the suction and discharge sides of all pumps, blowers and compressors.

B. Permanent pressure devices (gages, sensors, switches, etc.) shall be provided only where shown or specified, and shall be installed in accordance with the standard details shown on the drawings.

C. Gage taps, test plugs, and gages shall be as specified in Division 17.

D. Air release taps on pump discharge and suction lines shall be 1-inch minimum or as shown on the drawings.

E. Drains on all raw sewage piping shall conform to the standard details shown on the drawings.

2.09 NAMEPLATES

A. Nameplates shall be provided on each item of equipment and shall contain the specified equipment name and equipment number. Equipment nameplates shall be stamped on 1/16-inch thick Type 316 stainless steel or engraved on 1/16-inch thick laminated phenolic plastic. Phenolic nameplates shall have black background with machine-engraved, 3/16-inch white letters. The normal size of nameplates shall be 3/4-inch high by 2-inch long

B. Equipment tittles shall be spelled out on the nameplates. If abbreviations are required because of space limitations, abbreviations shall be submitted to the Project Representative prior to manufacture.

C. Nameplates shall be fastened to the equipment in an accessible location with No. 4 or larger oval head self-tapping stainless steel screws or drive pins. The use of adhesives will not be permitted.

2.10 LUBRICANTS

A. The Supply Contractor shall provide for each item of mechanical equipment a supply of the lubricant required for the commissioning period. Lubricants shall be of the type recommended by the equipment manufacturer. The Supply Contractor shall limit the various types of lubricants by consolidating them, with the equipment manufacturer's approval, into the least number of different types, consistent with the County’s current supplier. Not less than 90 days before the date shown in his construction schedule for starting, testing and adjusting equipment, the Supply Contractor shall provide the Owner with three copies of a list showing the required lubricants, after consolidation, for each item of mechanical equipment. The list shall show estimated quantity of lubricant needed for a full year's operation, assuming the equipment will be operating continuously.

2.11 ANCHOR BOLTS

A. Anchor bolts shall be designed for lateral forces for both pullout and shear in accordance with the provisions of Section 01031.

2.12 ELECTRICAL DEVICES

A. All motors, starters, controls, instruments, and other electrical components and devices furnished with mechanical systems shall be listed and labeled for the purpose for which it is used by Underwriters Laboratories (UL) or equivalent nationally recognized testing laboratory acceptable to the Washington State Department of Labor and Industry and to the local administrative authority. Where one of these listings is required but not available, Supply Contractor shall obtain written permission for a variance from King County. In addition, electrical components and devices shall comply with Division 16 specifications.

2.13 CONTROL PANELS

A. All control panels, factory, shop or field assembled, shall be labeled as a unit in accordance with UL 508. The UL 508 label shall be affixed to the inside of the door or cover, adjacent to the data pocket.

2.14 MOTORS AND CONTROLLERS

A. Provide under this Division 16 all motors for all equipment specified herein and all controllers other than those specifically indicated as being furnished under other sections; all equipment and wiring shall conform with applicable sections of Division 16.

B. Power wiring for all motors and associated controllers other than wiring for automatic controls will be furnished under Division 16. Unless otherwise noted, power supply will be 480 volts, 3-phase, 60 hertz for motors. Control voltages shall be 120 volts or lower, single phase, 60 hertz, or direct current, 30 volts or lower. Disconnect switches for roof exhaust fans or other equipment installed remote from its controller shall be furnished as an integral part of the equipment.

C. The horsepower ratings of electrical motors shown on the Drawings and Specifications are based on engineering design calculations and the selection of specific manufacturer's catalog items of mechanical equipment. If the actual equipment to be furnished requires a different motor horsepower, any resulting changes in motor branch circuits and associated circuiting must be included in the original contract bid.

D. Alignment of all motors to equipment shall be rechecked after all connections have been completed and after 48 hours of operation in designated service.

E. All equipment shall be designed and built for industrial service and be capable of delivering rated horsepower under the following applicable conditions:
   1. 100 degrees F maximum ambient temperature
   2. Voltage variations to +/-10 percent of nameplate rating
   3. Frequency variations to+/-5 percent of nameplate rating
   4. Combined voltage and frequency variations to +/-l0 percent total, as long as frequency does not exceed+/-5 percent

F. Unless otherwise specified, motors shall be TEFC.

2.15 SPARE PARTS

A. See Section 01750

B. Spare parts, wherever required by detailed specification sections, shall be stored in accordance with the provisions of this paragraph. Spare parts shall be tagged by project equipment number and identified as to part number, equipment manufacturer, and subassembly component (if appropriate). Spare parts subject to deterioration such as ferrous metal items and electrical components shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping.

PART 3 EXECUTION

3.01 EQUIPMENT INSTALLATION

A. Install equipment so nameplates are readily visible.

B. Basis for equipment and material installation is the published recommendations of manufacturer. Submit such recommendations for review.

3.02 TESTING

A. The Supply Contractor shall define all required field testing according to manufacturer’s recommendations. Equipment shall be provided and tested within the tolerances recommended by the equipment manufacturer. Additional equipment may be required to be installed and tested under the direction of installers who have been factory-trained by the equipment manufacturer. This requirement, however, shall not be construed as relieving the Supply Contractor of the overall responsibility for this portion of the work.

B. System-wide and plant-wide process testing shall be in accordance with Section 01660.

END OF SECTION

SECTION 17130

POWER SUPPLY AND CONDITIONING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies requirements for power supply and conditioning equipment required to support the instrumentation and communication systems.

B. Related Sections: The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to the proper performance of this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.
   1. Section 01730: Operations and Maintenance Manual.
   2. Section 17110: Panels.
   3. Section 17132: Single Phase Uninterruptible Power Supply Equipment.

1.02 QUALITY ASSURANCE

A. Referenced Standards: This Section incorporates by reference the latest revision of the following document. It is a part of this Section as specified and modified. In case of conflict between the requirements of this Section and that of the listed document, the requirements of this Section shall prevail.

Reference	Title
NFPA 70	National Electrical Code (NEC)
UL 1012	Power Units other than Class 2
UL 1283	Electromagnetic Interference Filters

B. Labeling: power supply equipment shall bear a UL or other label acceptable to the inspection authority having jurisdiction for the specified application.

1.03 SUBMITTALS

A. Procedures: Section 01300.

B. Dimensional Drawings.

C. Catalog Cuts including performance parameters.

D. Installation Information.

E. Wiring Diagrams.

F. Operations and maintenance information per Section 01730

1.04 PLANT ELECTRICAL SUPPLY SYSTEM

A. Electric power for instrumentation and communication systems shall be obtained from the power distribution system specified in Division 16. This power is not regulated, waveforms may be distorted, and significant amounts of electrical noise may be present.

B. Unless otherwise specified, provide all necessary power supply and conditioning equipment for all electrical power of the required voltages and current capacities and of adequate quality to ensure reliable operation of the instrumentation and communication systems.

C. Unless otherwise specified, assume that the power supply for instrumentation systems is 120 volts plus or minus 15 percent, 60 hertz plus or minus 3 hertz, and 5 percent harmonic distortion.

PART 2 PRODUCTS

2.01 GENERAL

A. Except for power supply units that form an integral part of an individual piece of equipment.
   1. Comply with UL 1012.
   2. Approved by UL, CSA, or FM for the application.

B. Power supply equipment serving multiple instrument loops shall be provided in hot-standby configurations such that failure of a single unit will not disable all or any part of the instrumentation and communication systems.

C. Diode isolation for redundant direct current supply units.

D. Do not ground the DC power supply negative output terminal.

2.02 ALTERNATING CURRENT (AC) VOLTAGE REGULATORS

A. Solid-state tap-changing type, insensitive to line frequency variations between 47 and 63 hertz. Ferro resonant units are not acceptable.

B. Output regulation for input voltage variation from 85 to 125 volts shall not exceed 4 percent.

C. Output regulation for load variation from 0 to 100 percent shall not exceed 1.0 percent.

D. Response time shall be 1.0 cycles or less.

E. Voltage regulators serving panelboards and control panels shall have a load capacity not less than 200 percent of the connected load.

F. Voltage regulators serving individual instruments shall have a load capacity not less than 125 percent of the connected load.

G. Power loss shall not exceed 2 percent of the regulator capacity, and harmonic distortion introduced by the regulator shall not exceed 0.1 percent.

H. Regulator output shall be fully protected against internal faults, external overloads, and short circuits.

I. Three-phase units shall be 4-wire, wye-connected, and capable of supporting 100 percent unbalanced load.

2.03 NOISE-SUPPRESSION ISOLATION TRANSFORMERS

A. For AC powered instrumentation loads containing solid-state circuitry where such is not included within the instrument.

B. Triple box shield type.

C. Each coil shall be completely enclosed in a grounded conductive faraday shield, and the overall transformer enclosed in a faraday shield.

D. Common mode noise attenuation between primary and secondary shall exceed 140 dB at 1.0 kHz.

E. Dielectric strength shall be 2500 volts minimum.

F. Serving panelboards and control panels shall have a load capacity not less than 200 percent of the connected load.

G. Serving individual instruments shall have a load capacity not less than 125 percent of the connected load.

H. Power loss shall not exceed 2.0 percent of the maximum load rating.

I. Harmonic distortion introduced by the isolation transformer shall not exceed 0.1 percent.

J. Three-phase units shall be 4-wire, wye-connected, and capable of supporting 100 percent unbalanced load.

K. Acceptable manufacturer:
   1. Topaz T1.
   2. Approved equal.

2.04 DIRECT-CURRENT POWER SUPPLIES

A. Dual (Redundant) DC Power Supply:
   1. UL labeled, linear regulated redundant power package with the following features:
   2. Dual (redundant) isolation diodes.
   3. Dual and identical DC power supplies.
   4. Barrier block terminals for all wiring connections.
   5. Connections for two 120 VAC power sources.
   6. 24 VDC output voltage with accessible adjustment for a minimum of plus or minus 0.5 volts; floating output.
   7. Output voltmeter and output ammeter for each internal power supply.
   8. Control for automatically selecting one of the two power supplies.
   9. SPDT (minimum) alarm contact for external alarm circuit tripped for power supply failure.
   10. Output voltage regulation shall not exceed plus or minus 0.05 percent for line voltage variation from 93 to 132 volts.
   11. Output voltage regulation between full load and no load shall not exceed plus or minus 0.05 percent.
   12. Ripple shall not exceed 2mVrms.
   13. Electronic current limiting to provide short circuit protection and recovery on the output.
   14. Wall mounted enclosure suitable for locating on mounting panel inside a control panel.
   15. Automatic adjustable output over-voltage shutdown with alarm and over-temperature protection shall be provided. EMI filtering of both AC input and DC output shall be provided.
   16. Minimum rated output current shall be as listed in the instrument index Section 17901
   17. Acceptable manufacturer:
      a. Acopian Series RWL24.
      b. Approved equal.

B. Single DC Power Supply:
   1. UL labeled, linear regulated power supply with the following features:
   2. Barrier block terminals for all wiring connections.
   3. 120 VAC input voltage.
   4. 24 VDC output voltage with accessible adjustment for a minimum of plus or minus 0.5 volts.
   5. Floating output.
   6. Output voltage regulation shall not exceed plus or minus 0.15 percent for line voltage variation from 105 to 125 volts.
   7. Output voltage regulation between full load and no load shall not exceed plus or minus 0.1 percent.
   8. Ripple shall not exceed 1.5mVrms.
   9. Electronic current limiting to provide short circuit protection and recovery on the output.
   10. Electronics shall be fully enclosed in wall-mounted enclosure suitable for locating on mounting panel inside a control panel.
   11. Output current capacity shall be 3.5 Amperes at 40 degrees C.
   12. Acceptable manufacturer:
      a. Acopian Gold Box Single Output Model B24G350.
      b. Approved equal.

2.05 UNINTERRUPTIBLE POWER SYSTEM (UPS)

A. Single Phase UPS: Per Section 17132.

2.06 SURGE PROTECTION

A. For protection against line generated transients for both normal and common mode protection.

B. The unit shall be a non-degrading, solid state, series low pass filter with non-linear characteristics with the following features:
   1. UL compliant for UL category 1283 for series filter safety.
   2. 120 VAC single-phase input voltage.
   3. 30 amperes load current; 60 hertz power line frequency.
   4. Barrier type terminal blocks for line and load hard-wired connections.
   5. Instantaneous response time.
   6. 40 db (minimum) from 50 KHz through 50 MHz transient reduction.
   7. One percent or better load regulation from no load through full load.
   8. Surge current ratings of 10 millisecond at 20 times nominal rating.
   9. One second at five times nominal rating, five seconds at three times nominal rating.
   10. Operating temperature range of minus 40 degrees C to plus 45 degrees C.
   11. Acceptable manufacturer:
      a. Control-Concepts Islatrol I-130.
      b. Approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Unless otherwise specified, mount in control panels and connect in compliance with the manufacturer's instructions.

B. Provide line side disconnect switches.

C. Provide line and load side overcurrent protection in compliance with NFPA 70.

D. Not used.

E. Small power supply and conditioning equipment may be mounted in the panel served. Larger units shall be mounted adjacent to the equipment served.

F. Where unconditioned power is brought into control panels, it shall be enclosed in metallic raceways within the panel.

G. When larger than 5 KVA load capacity supported from surfaces other than concrete provide with sound isolators.

END OF SECTION

SECTION 17110

PANELS

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies requirements for panels, cabinets, consoles, and racks for instrumentation and communication equipment. Additional requirements are specified in sections specifying the various instrumentation and communication systems.

B. Related Sections: The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to the proper performance of this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.
   1. Section 17000: Process Instrumentation and Control Requirements.
   2. Section 17130: Power Supply and Conditioning Equipment.

1.02 QUALITY ASSURANCE

A. Referenced Standards: This Section incorporates by reference the latest revision of the following document. It is a part of this Section as specified and modified. In case of conflict between the requirements of this Section and that of the listed document, the requirements of this Section shall prevail.

Reference	Title
FED STD 595A	Federal Standard Colors
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
NFPA 79	Electrical Standards for Industrial Machinery
UL 94	Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
UL 508	Industrial Control Equipment

1.03 SUBMITTALS

A. Procedures: Section 01300.

B. Dimensioned front view drawings.

C. Dimensioned internal equipment layout drawings.

D. Panel assembly drawings including sections showing clearances between face and rear mounted equipment.

E. Nameplate engraving schedule showing engraving by line, character size, and nameplate size.

F. Enclosure manufacture drawings.

G. Panel seismic calculations.

H. Panel wiring diagram for each panel. The diagram shall meet the requirements as set forth in the NFPA 79 Electrical standards for industrial machinery.

I. See Section 11093 for additional requirements.

1.04 DESIGN REQUIREMENTS

A. Enclosures shall be limited to the following NEMA 250 types:

Type	Location
NEMA 12	Control rooms, switchgear rooms, MCC rooms
NEMA 4X SS	All other locations and applications

B. Panel Design:
   1. General: Panel size and equipment layout requirements shall allow room for easy accessibility for servicing.
   2. No panel mounted operator interface devices, such as selector switches, will be mounted greater than 72 inches or less than 36 inches above the finished plant floor.
   3. No panel mounted instruments, such as recorders, will be mounted greater than 66 inches or less than 40 inches above the finished plant floor.
   4. Panelboards: Each panel containing 120-volt powered equipment with an aggregate load greater than 1200 watts shall be provided with a panelboard per Division 16.
   5. Annunciators: Annunciators shall not be mounted with the top frame in excess of 90 inches above the finished plant floor.
   6. Power supplies:
      a. Panels containing direct current powered instruments or serving as the termination point for transmission loop powered field instruments shall contain a dual DC power supply system.
      b. The DC power supply system shall be per Section 17130.

C. Labeling: Manufactured in conformance with UL 508 and shall bear the UL label.

PART 2 PRODUCTS

2.01 MATERIALS AND QUALITY

A. General:
   1. Panelwork shall be designed for seismic requirements per Section 17000**.**
   2. Cutouts for future equipment shall be blanked off with suitable metal covers.
   3. Instrument tag numbers shall be identified on the panel rear.
   4. Nameplates shall identify face-mounted instruments.
   5. Instruments shall be mounted in a manner that allows ease of access to components and ease of removal.
   6. Face-mounted instruments that are more than six inches deep, weigh more than 10 pounds, or exert more than a 4 ft-lb moment force on the face of the panel shall be supported underneath at the rear by a 1-inch x 1/8-inch thick steel angle.
   7. Face-mounted equipment shall be flush or semi-flush with escutcheons.
   8. Floor mounted cabinets less than 60 inches high shall be provided with floor stands to raise the top of the panel to 60 inches above the floor or work platform. Or, if panel weighs less than 100 pounds and wall space is available, wall mounting may be used in lieu of a floor stand.

B. Fabrication of NEMA Type 12 Industrial Use, Indoor Cabinets with Front Doors:
   1. Enclosure fabricated from 16-gauge minimum thickness sheet steel. Face-mounted instruments shall be mounted in the door.
   2. Interior frame or otherwise formed so as to provide a rigid structure.
   3. Doors shall be hung on full-length continuous (piano-type) hinges and equipped with vault-type latch capable of accepting a 3/8-inch-shackle padlock.
   4. Three-point latch hardware shall be provided for doors exceeding 48 inches height. Door width shall not exceed 30 inches.

C. Fabrication of NEMA Type 4X Cabinets:
   1. NEMA 250, Type 4X requirements.
   2. Fabricated from 14 gauge (minimum thickness) Type 316L stainless steel (or fiberglass when specifically specified) and provided with an interior frame or otherwise formed to provide a rigid structure.

3. Where face-mounted instruments are specified mount on an interior sub-panel.
4. Doors:
   a. Vault-type latch and, if greater than 48 inches high, three-point latch hardware.
   b. Latch shall accept a 3/8-inch shackle padlock.
   c. Unless shown otherwise, door width shall not exceed 36 inches.
5. For cabinets located outdoors, equip with rain and sun shields.

D. Fabrication of NEMA 7D Cabinets: Not Used.

2.02 HEATING AND VENTILATING

A. Cooling required to maintain the internal panel temperature below 80 degrees F when all equipment is operating at its maximum heat load and the ambient temperature is 100 degrees F. If cooling is required, filtered forced air ventilation shall be provided for NEMA 12 cabinets and either closed glycol loop heat exchange system or a mechanical refrigeration system for NEMA 4X.

B. Fans shall be equipped with UL-approved washable filters and provide at least 240 CFM. Noise level at three feet from exterior wall and 30 degrees off axis shall not exceed 60 db.

C. Outdoor cabinets shall not be insulated and shall be provided with thermostatically controlled space heaters.

D. Heater wattage shall to maintain the air temperature inside the cabinet above the dew point or 50 degrees F, whichever is higher, at all times.

E. If space heater surface temperature exceeds 120 degrees F, an expanded metal guard shall be provided.

F. When a strip type heater is used, the heater shall be a 240 VAC heater and connected to 120 VAC and sized to produce the required heat at 120 VAC.

G. Thermostat Acceptable Manufacturer:
   1. Honeywell T631B1013.
   2. Penn Controls A28AA-4.
   3. Approved equal.

2.03 COATING

A. Except for stainless steel and fiberglass panels, NEMA Type 4X panels and cabinets shall be painted inside and out. Finishes shall be in accordance with paragraph 17110-3.02.

B. Treat cutouts to prevent corrosion.

2.04 NAMEPLATES

A. Machine engraved laminated black phenolic nameplates with white lettering shall be provided for panel mounted equipment.

B. Nameplate engraving shall be as specified and shall carry the instrument tag number in 3/32-inch minimum size lettering on the bottom line, or engraved as shown on the Drawings.

C. Nameplates shall be attached to the panel with a minimum of two self-tapping 316 stainless steel screws.

D. Wording may be changed if changes are made prior to commencement of engraving.

E. Machine embossed metallic adhesive labels shall identify tag number of instruments inside panels.

F. Attach to panel surfaces, not to instruments.

G. Machine embossed, adhesive backed nameplates shall identify the tag number of equipment inside cabinets.

2.05 INTERCONNECTION WIRING AND ELECTRICAL DEVICES

A. Interconnection Wiring:
   1. Power, control and signal wiring inside panels:
      a. Conductor insulation shall be rated for 600 volts and 90 degrees C.
      b. All conductors shall be stranded copper.
      c. Power and control conductors in panels have insulation type THHW, minimum 16 AWG.
      d. Wiring for instrumentation analog signals shall be minimum 18 AWG; aluminum foil twisted shielded pairs, Beldon type 8760, or approved equal. Wiring for instrumentation analog signals shall be run continuously from measuring instrument to control cabinet terminal strips without splices.
      e. Conductor size vs. fuse rating for conductors inside panels shall be as follows:

Fuse	Wire
<= 1 AMP	18 AWG
5 AMPS	16 AWG
15 AMPS	14 AWG
20 AMPS	12 AWG

   2. Supported independent of terminations by slotted flame retardant plastic wiring channels.
   3. Channels shall comply with UL94, Type V. Wiring channel fill shall not exceed 40 percent.
   4. Wiring shall be tagged at terminations with machine printed plastic sleeves.
   5. Not used.
   6. Not used.
   7. Not used.
   8. Not used.
   9. Label each control and instrumentation wire per West Point Treatment Plant Numbering System which shall be available upon request. Typically the wire number is the loop number with a unique letter suffix, e.g. VA 23AB01A, B, C, etc.
   10. Color coding of wires within control panels shall be as follows:

WIRE COLOR CODES

Code	Type	Color	Use	Volts
S1	TSP	RED	SIGNAL (+)	5-24VDC
S2	TSP	BLACK	SIGNAL (-)	5-24VDC
SG	TSP	BARE	SHIELD DRAIN	5-24VDC
S1	TRIAD	BLACK	SIGNAL	0-24VDC
S2	TRIAD	WHITE	SIGNAL	0-24VDC
S3	TRIAD	RED	SIGNAL	0-24VDC
SG	TRIAD	BARE	SHIELD DRAIN	0-24VDC
24P	SINGLE	RED	POWER (+)	24VDC
24C	SINGLE	WHITE/RED	COMMON (-)	24VDC
D	SINGLE	RED	CONTROL	24 VDC
125P	SINGLE	BLUE	POWER	125VDC
125C	SINGLE	WHITE/BLUE	COMMON	125VDC
B	SINGLE	BLUE	CONTROL	125VDC
L	SINGLE	BLACK	POWER	120VAC
N	SINGLE	WHITE	NEUTRAL	120VAC
PG	SINGLE	GREEN	POWER GND	120VAC
SG	SINGLE	GREEN/YELLOW	SIGNAL GND	120VAC

WIRE COLOR CODES, continued

Code	Type	Color	Use	Volts
UL	SINGLE	BLACK	UPS POWER	120VAC
UN	SINGLE	WHITE/GRAY	UPS NEUTRAL	120VAC
A	SINGLE	BROWN	ANNUNCIATOR	120/24
C	SINGLE	VIOLET	CONTROL	120
IO	SINGLE	ORANGE	ISOL I/O	120/24
M	SINGLE	YELLOW	MCC	120
R	SINGLE	PINK	RTU	12VDC
IS	SINGLE	LIGHT BLUE	INTRINSIC SAFE	LOW

11. Power and control wiring shall be carried in covered channels separate from low voltage analog signal circuits.
12. Terminal blocks:
    a. UL listed.
    b. Rail mounted.
    c. Compression clamp type terminal rated for 600 volts.
    d. 22 AWG to 12 AWG copper wire size range.
    e. Mark using marker carrier and preprinted marker bars for the tag numbers.
    f. Acceptable manufacturer:
        1. Entrelec Series 5000: Typical Entrelec catalog numbers are the following:
            a) Terminal Block: Type MS 4/6.
            b) Switch Block: Type M 4/6.SNT.
            c) Fuse Block: Types M 4/8.SFL, M 4/8.SFD, M 4/8.SFD1.
        2. Phoenix Contact.
        3. Approved equal.
13. Field connections shall be to separate terminal blocks. Terminal blocks for field terminations shall be in a separate part of the panel close to where the field cables enter the panel.
14. External circuits shall be fused. Fuses shall include blown fuse indicator lamps.
15. Comply with UL 508 requirements in construction.

2.06 PANEL GROUNDING

A. Each panel shall be provided with two copper ground bars. One bar shall be bonded to the panel frame or sheet metal and to the station ground system. The second (signal) ground bar shall be mounted on insulated stand-offs and shall be bonded to the frame ground bar at one point only.

B. Signal circuits, signal cable shields, and low-voltage DC power supply commons shall be bonded to the signal ground bar.

C. Surge protectors and separately derived AC power supplies shall be bonded to the frame ground bar.

PART 3 EXECUTION

3.01 GENERAL

A. Panels:
    1. Mount panels and cabinets that are supplied mounted on factory fabricated assemblies in compliance with Paragraph 17000-3.01.
    2. Mount record drawings for wiring, connection and interconnection diagrams behind a piece of Plexiglas on the inside of one (or more) door(s).

B. Not used.

3.02 COATING

A. Except for stainless steel enclosures, the metal surfaces of panels, cabinets, and consoles shall be prepared, primed, and finish coated. Standard panel colors which shall be used are Federal Standard Color 25240, blue for panel exterior and Federal Standard Color 27880, white for panel interior.

B. Except for stainless steel enclosures, the metal edges of cutouts for instruments, switches, lights, etc., in panels, cabinets, and consoles shall be prepared, primed, and finish coated in the same color as the associated panel.

END OF SECTION

SECTION 17000

PROCESS INSTRUMENTATION AND CONTROL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies requirements for process instrumentation and control for Division 17, which consists of hardware, software, and services necessary to provide the control functions specified.

B. Related Sections: The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to the proper performance of this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.
   1. Section 01031: Seismic Criteria.
   2. Section 01660: Testing, Training, and Commissioning.
   3. Section 01720: Record Drawings.
   4. Section 01730: Operations and Maintenance Information.
   5. Section 01999: Reference Forms.
   6. Division 16: Electrical Work.
   7. Section 17110: Panels.

1.02 QUALITY ASSURANCE

A. Referenced Standards: This Section incorporates by reference the latest revision of the following document. It is a part of this Section as specified and modified. In case of conflict between the requirements of this Section and that of the listed document, the requirements of this Section shall prevail.

Reference	Title
API RP551	Process Measurement Instrumentation
ISA 20	Specification Forms For Process Measurement and Control Instrumentation, Primary Elements, and Control Valves
ISA 5.1	Instrumentation symbols and Identification
ISA 51.1	Process Instrumentation Terminology
ISA 5.3	Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer systems
ISA RP12.2.02	Recommendations for the Preparation, Content and Organization of Intrinsic Safety Control Drawings
NFPA 70	National Electric Code (NEC)
NFPA 79	Electrical Standards for Industrial Machinery
NFPA 820	Fire Protection in Wastewater Treatment and Collection Facilities
UBC 1632	Uniform Building Code
UL 508	Industrial Control Equipment

B. Labeling: all electrical control panels shall be manufactured in conformance with UL 508 and shall bear the UL label.

C. Perform detailed design for all interconnected components. Interconnected components shall include mechanical and electrical equipment specified in other sections of the Contract Documents, as well as process control system equipment specified within Division 17.

D. Calibrate, test, and start up the complete process instrumentation and control system as specified in Section 01660.

E. Place the completed system in operation including tuning loops and making final adjustments to instruments as required during system and Facility start-up. See Section 01660.

F. Provide the services of an instrumentation and controls start up engineer for testing, calibration, programming modification and adjustment activities as specified in Section 01660.

1.03 SUBMITTALS

A. Procedures: Section 01300.

B. Catalog Cuts.

C. Component fabrication drawings. Hard copy as well as electronic format.

D. Seismic design information including a list of equipment weighing 400 pounds or more.

E. Certifications.

F. Factory test schedule and procedure including all test forms.

G. Field test schedule and procedure including all test forms.

H. Test Reports.

I. Operation and maintenance information per Section 01730.

J. Wiring Diagrams: Hard copy as well as electronic format.

K. Not used.

L. Interconnection Diagrams. Hard copy as well as electronic format.

M. See Section 11093 for additional requirements.

1.04 DEFINITIONS

A. Unless otherwise specified, the definitions of terminology used in Division 17 shall be as defined in ISA S51.1.

B. Electronic Format:
   1. Drawings shall be AutoDesk AutoCAD 2000® ".dwg" format files.
   2. Tabular data shall be submitted in electronic format compatible with Microsoft Excel 97®.
   3. Text data shall be submitted in electronic format compatible with Microsoft Word 97®.

C. Existing SCS System: Used for telemetering alarms and status information. The existing SCS system includes the PLC system and special communication and interface modules.

1.05 DESCRIPTION OF SYSTEM

A. Process Control System consists of the following, installed in accordance to NFPA 70:
   1. A microprocessor based controller such as a PLC
   2. Hardwired control panel(s) including conventional panel-mounted switches, controllers, recorders, and indicators; specific purpose panels, local control panels for individual equipment manual and automatic control. Manufactured and including the requirements of UL 508.
   3. Conventional field instrumentation including primary elements, indicating transmitters, level, and pressure switches.
   4. Final control elements such as valve positioners and solenoids.

B. The process control system interfaces with switchgear and other auxiliary equipment.

1.06 EXISTING CONDITIONS

A. Examine the mechanical Drawings and Specifications to determine actual locations, sizes, materials, and ratings of process connections.

B. The “as-built” drawings of previous work presented in these Contract Documents are for information only and may not represent existing conditions. Field investigate all existing facilities requiring modifications to ascertain the exact physical and electrical conditions in each case. After field investigation, provide a detail design and implement the proper method for physical installation and interface wiring of the required modifications.

1.07 DESIGN AND PERFORMANCE REQUIREMENTS

A. Catalog Cuts:
   1. Include catalog information, technical specifications, and application information for each piece of equipment to be furnished.
   2. Edit catalog cuts to indicate only those items, models, or series of equipment to be furnished. Cross out or otherwise obliterate all extraneous materials information.
   3. Include data sheets in accordance to ISA 20 and a complete listing of all instruments to be furnished or modified as well as any existing equipment.

B. Drawings:
   1. The Drawings are functional in nature and do not show exact locations of equipment and may not show all necessary interconnections between equipment.
   2. Fabrication drawings:
      a. Detailed interconnection diagrams, wiring diagrams, and process and instrument diagrams with all electrical and electronic components clearly identified by tag number.
      b. Detailed construction drawings for all panel layouts and equipment enclosures with dimensions in inches.
   3. Wiring diagrams shall carry a uniform and coordinated set of wire numbers and terminal block numbers in compliance with Division 16 and Section 17110 to permit cross-referencing between contract documents and the drawings prepared by the Contractor.
   4. Each control circuit, control panel layout design, etc., shall be represented on a unique drawing. Control circuits and panel layouts referenced to typical diagrams are not acceptable.
   5. Drawing symbol format shall comply with NFPA 79, ISA 5.1, ISA 5.3 and where appropriate, ISA RP 12.2.02.
   6. Hardcopy plots shall be 11-inch by 17-inch or 22 inch by 34 inch, as required.
   7. Lettering size: 0.125-inch minimum for 22 inch by 34 inch, 0.063-inch for 11-inch by 17-inch.
   8. Drawings shall have borders and title blocks identifying the Contract, system, and revisions to the drawing, and type of drawing. Borders and title blocks shall conform to current County drafting standards.
   9. Each release of a drawing shall carry a revision number, date, and a brief description of the changes. All changes associated with a given release shall be indicated on the drawing by a revision flag. Changes on the latest revision shall be indicated by clouding.
   10. Transfer record drawings per Section 01720 to the County in electronic format on CD and hard copy when work is completed.

C. NOT USED.

D. Wiring Diagrams:
   1. Panels: comply with NFPA 79.
   2. Show components of a control panel in an arrangement similar to the actual layout of the panel.
   3. Show internal wiring between devices within the panel.
   4. Show all terminal blocks whether used for internal or field wiring. Those used for field wiring shall be clearly identified as such.
   5. Wiring diagrams shall indicate insulation color code, signal polarities, and show wire numbers and terminal block numbers.

E. Interconnection Diagrams:
   1. Provide for field wiring.
   2. Show each panel and field devices.
   3. Show wire numbers, cable numbers, raceway numbers, terminal box numbers, terminal block numbers, panel numbers, and field device tag numbers.
   4. Comply with NFPA 79.

F. Certifications:
   1. Temperature: test data certified by the manufacturer to demonstrate that field electronic devices are suitable for the specified ambient temperatures.
   2. Corrosion: test data showing design features of the electronic equipment provided to protect against damage by the specified atmospheric contaminants and specific evidence that similarly protected electronic equipment has operated in similar environments for a period of not less than five years without failure due to corrosion.

G. Seismic Design:
   1. Procedure and submittals: per Section 01031.
   2. Structures and equipment shall be braced to prevent damage from specified forces.
   3. Equipment shall not be required to function properly during periods of seismic disturbance, but shall be capable of manual restart without repair or modification following a disturbance.

1.07 FACTORY TEST

A. Prior to factory testing, complete the following:
   1. Inspect and test the process instrumentation and control system including the control panel(s), microprocessor based controllers, etc., to ensure they are operational.
   2. Ensure that proper materials have been used during manufacture and assembly and that parts and materials have been correctly assembled and wired.
   3. Complete an integrated test:
      a. Interconnect and test the process control and instrumentation system, except for primary elements, final control elements, and small control stations.
      b. Exercise and test all functions to ensure proper manufacture and assembly of the completed panel and/or system.
      c. Test all panels in conjunction with associated equipment specified in Section 11093.
      d. Simulate inputs and outputs for primary elements, final control elements, and small control stations excluded from the test.

B. The Project Representative reserves the right to witness the factory test. Provide a written test schedule and notify the Project Representative prior to the test or as specified in Section 11093.

C. Factory testing shall be conducted in accordance with the requirements specified in Section 11093 and shall be set up to demonstrate the following functions as a minimum for witness testing:
   1. Exercise and test all functions, including microprocessor based controller software functions.
   2. Provide test equipment to simulate discrete and analog inputs and outputs. All I/O shall be exercised.
   3. Provide a testing simulation program to exercise all discrete and analog outputs to confirm proper loop operation.
   4. Provide test screens for the graphics display if provided to display and alarm simulated statuses and confirm system response to operator inputs.
   5. Demonstrate that all panels and subsystems have the required spare capacity for expansion. Include test for I/O storage capacity and program memory capacity.

D. At a minimum, have the following at the test for review and use:
   1. All applicable Drawings, Specifications, Addenda and Change Orders.
   2. Factory test procedure including all test forms.
   3. Shop drawings and hardware submittals for equipment being tested.
   4. Software documentation.

E. Correct deficiencies prior to shipment of the equipment to the work site and retest.

F. Control Panel:
   1. Completely wired and tested prior to being shipped to the job site.
   2. Shipped as a single unit to job site after testing is complete.
   3. No internal wiring shall be disconnected for transportation

1.08 DELIVERY, STORAGE, AND HANDLING

A. Shipping:
   1. Ship as a single unit to work site.

B. Delivery Inspection: notify the Project Representative and provide access for inspection upon arrival of any material or equipment to be incorporated into the work. Remove protective covers when required.

PART 2 PRODUCTS

2.01 MATERIALS AND QUALITY

A. Material shall be new, free from defects, and of the quality specified. Each type of instrument, accessory, and device shall be by the same manufacturer.

B. Unless otherwise specified, electronic equipment shall be of solid-state construction. Components of standard electronic assemblies shall not be replaced with components of different characteristics in order to meet the performance requirements of the specification. Parts shall be as shown in the instruction manuals and shall be replaceable with standard commercial components of the same description without degrading the performance of the completed assembly.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
   The on site instrumentation and controls start up engineer shall supervise and coordinate all activities related to the requirements of Division 17. Duties and responsibilities to be as specified in Section 01660.

B. Signal Transmission:
   1. Unless otherwise specified, signal transmission between electric or electronic instruments not located within a common panel shall be 4 to 20 milliamperes and shall have a loop compliance of at least 500 ohms.
   2. Two-wire loop transmitters shall operate at 24 VDC.
   3. Unless otherwise shown, milliampere signals from the field shall be converted to 1 to 5 VDC signals at the field terminal block of each panel. Conversion error shall not exceed 0.1 percent. All instruments within a panel shall be parallel wired with 1-5 VDC signals.
   4. Loops shall be grounded at the field terminal block by bonding to the instrument panel signal ground bus. Separate grounded conductors shall be provided for each loop. Daisy chaining of grounded conductors from one loop to another is not allowed.
   5. Provide isolating amplifiers for field equipment possessing a grounded input or output, or having a common mode voltage other than system ground.
   6. Convert high frequency (greater than 50 Hz) pulse rate signals from field transmitters to analog 1-5 VDC signals at the panel.
   7. Convert platinum resistance temperature detector (RTD) outputs to 4-20 milliampere signals at the RTD,. The temperature milliampere signal may be brought from the field to the panel and converted to a 1-5 VDC signal.

8. All other transmission systems, such as impulse duration, low frequency pulse rate, and voltage regulated, will not be permitted. When transmitters with non-standard outputs are specified, their output shall be converted to 4 to 20 milliamperes at the field instrument.

3.02 TESTS AND INSPECTIONS

A. General Requirements:
   1. Meet requirements of Section 11093 andSection 01660.
   2. All required tests beginning with the Factory Test, will be witnessed by the Project Representative.
   3. Notify the Project Representative of the test date fourteen days prior to the test.
   4. Submit a detailed step-by-step test procedure, complete with forms for the recording of test results, testing equipment used, and identification of the technician performing and witnessing the test.
   5. Test Reports: Submit completed test forms with results fully annotated, signature of tester, and date test performed.

B. Test Equipment:
   1. Unless specified otherwise, provide all test equipment to complete all specified tests.
   2. Test equipment used to simulate inputs and read outputs shall have a rated accuracy at the point of measurement at least three times greater than the component under test.
   3. Each test instrument shall be calibrated prior to the commencement of a testing activity and at the completion of a testing activity.
   4. Submit dated and certified calibration reports traceable to the National Institute of Standards and Testing (NIST) with the test report. Calibration certification date shall be within three months of date of use on this Contract.
   5. Provide buffer solutions and reference fluids for tests of analytical equipment.

C. Test Requirements:
   1. Factory test: see Paragraph 17000-1.07.
   2. Individual component calibration and test:
      a. Each instrument and final element shall be field calibrated in accordance with the manufacturer's recommended procedure. Instruments shall then be tested in compliance with ISA 51.1 and the data entered on the applicable test form.
      b. Alarm trips, control trips, and switches shall be set to initial values provided by the equipment supplier specified in Section 11093.
      c. Final elements shall be checked for range, dead-band, and speed of response.
      d. Any component that fails to meet the required tolerances shall be repaired by the manufacturer or replaced.
      e. Repeat above tests until the component is within tolerance.
   3. Loop test:
      a. Test each instrument loop as an integrated system. This test shall check operation from transmitter to signal receiving components, and from the main control panel to final control elements.
      b. Inject signals at the field terminations to simulate primary measuring elements.
      c. Output of each auto/manual station shall be manually varied from 0 to 100 percent, and correct operation of final control element verified.
      d. Each alarm circuit shall be manually actuated at the field sensor.
      e. Verify correct operation of the applicable annunciator window.
      f. Where annunciator follower contact is connected to the PLC system, and/or the Metrotel system, correct PLC and Metrotel responses shall be monitored and verified.
   4. Closed-loop test:
      a. Test shall demonstrate stable operation of the loop under actual Facility operating conditions. This test includes adjustment of loop tuning parameters.
      b. Unless otherwise specified, adjust tuning parameters (proportional gain, integral time constant, and derivative time constant) for each control loop to provide ¼-amplitude damping.
      c. Use a chart recording showing loop response to a step disturbance for each loop.

d. Make two charts for cascade loops, one showing the secondary loop response with its set point on manual, and the second showing overall loop response.
e. Chart recordings shall be made at sufficient speed and amplitude to clearly show specified amplitude damping and shall be annotated to show loop number and title, and settings of parameters and set point.

5. SCS system test:
   a. Coordinate with the Project Representative for the requirements of this test.
   b. Provide the services of a qualified technician for 24 labor-hours to assist in this test.
   c. Check that the equipment is functioning correctly and as specified.
   d. Check that all specified signals are telemetered and received at the appropriate County facility as required.

END OF SECTION

SECTION 16825

MISCELLANEOUS ELECTRICAL DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies miscellaneous electrical control and power devices, relays, magnetic contactors, disconnect switches, manual starters, and overcurrent protection.

B. Related Sections: The work of the following sections is related to the work of this Section. Other sections, not referenced below, may also be related to the proper performance of this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.
   1. Section 01730: Operations and Maintenance Information.
   2. Section 16010: General Requirements for Electrical Work.

1.02 QUALITY ASSURANCE

A. Referenced Standards: This Section incorporates by reference the latest revision of the following document. These references are a part of this Section as specified and modified. In case of conflict between the requirements of this Section and that of the listed document, the requirements of this Section shall prevail.

Reference	Title
NEMA 250	Enclosures for Electrical Equipment (1,000 volts maximum)
NEMA ICS 1	Industrial Control and Systems: General Requirements.
NEMA ICS 2	Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2,000 Volts AC or 750 Volts DC.
NEMA KS 1	Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)

1.03 SUBMITTALS

A. Procedures: Section 01300.

B. See Sections 11093 and 16010 for submittals requirements.

PART 2 PRODUCTS

2.01 CONTROL DEVICES

A. Pushbuttons:
   1. Flush head, heavy-duty, with NEMA rating to match enclosure type.
   2. Operators: Red for stop functions and black for all other functions.
   3. Provide pushbuttons designated "Lock-Out-Stop" (LOS) with a padlockable attachment to maintain the device in a depressed (stop) position.
   4. Escutcheon legend: As shown on the Drawings.
   5. Unless otherwise indicated, momentary contact type.
   6. Contact blocks:
      a. NEMA ICS 2 designation A600 except when switching circuits monitored by programmable controllers or other solid state circuits.
      b. Hermetically sealed, logic-read type.
      c. Acceptable manufacturer:
         1) Allen-Bradley.
         2) Square D.
         3) Approved equal.

B. Selector Switches:
   1. Heavy-duty, with NEMA rating to match enclosure type.
   2. Unless otherwise indicated, contact blocks and number of positions as required to perform the specified operations.
   3. Contact blocks: Rated as specified in this Section.
   4. Escutcheon legend: As specified on the Drawings.
   5. Acceptable manufacturer: Where solid state loads are switched, and the specified contact development cannot be obtained with logic-read type contacts:
      a. Blue Line with Type D contacts.
      b. Approved equal.

C. Indicating Lights:
   1. Indicating lights: 5 to 6 vdc light emitting diodes (LEDs) with push-to-test feature.
   2. Testing: As a group using a common lamp test button.
   3. Indicating light colors: Per Section 16010.
   4. Heavy-duty, with NEMA rated socket/wiring to match enclosure type.

D. Control Stations:
   1. Unless otherwise indicated, NEMA 12.
   2. Pushbuttons: Protective Hypalon boots.
   3. In hazardous areas: NEMA 7.
   4. When indicating lights are specified, size to accommodate the transformer type lights.
   5. Acceptable Manufacturer:
      a. Allen-Bradley, 800 H series.
      b. Crouse-Hinds, NCS series.
      c. Approved equal.

2.02 CONTROL RELAYS

A. Load-switching Control Relays:
   1. When used for switching loads (solenoids, actuators, contactors, motor starter coils, etc.): Heavy-duty machine tool type.
   2. Relays that have contacts used for remote interlocking or when the switching load is not shown: Heavy-duty machine tool type.
   3. Contacts: As a minimum, 4-pole and field interchangeable to either normally open or normally closed. Relay shall be capable of accepting a 4-pole adder.
   4. AC relays: NEMA A600 contact ratings and electrical clearances for up to 600 volts.
   5. DC relays: NEMA P300 contact ratings and electrical clearances for up to 250 volts.
   6. Acceptable Manufacturer:
      a. Allen Bradley Bulletin 700.
      b. Square D Class 8501.
      c. Approved equal.

B. Logic Level Switching Control Relays:
   1. Minimum of three SPDT, gold-flashed, fine silver contacts rated 3 amps resistive at 120V AC or 28V DC.
   2. Plug-in type with heavy-duty, barrier-protected screw terminal sockets and clear polycarbonate dust cover with clip fastener.
   3. AC models: Neon lamp indicator wired in parallel with coil.
   4. Acceptable manufacturer (Control relays used for switching solid-state logic and signal circuits):
      a. Potter Brumfield series KUP.
      b. Approved equal.

C. Latching Relay:
   1. Electrically actuated latching relay or an industrial relay with an electrically operated latching attachment.
   2. Latching mechanism: One SET coil and one RESET coil rated for continuous duty on 120 VAC, or as otherwise shown on the Drawings.

3. Maintain the last state upon a power failure.
4. Contacts: Rated B300 and hermetically sealed in a glass envelope.
5. Normally open and normally closed as shown on the Drawings.
6. Acceptable manufacturer:
   a. Allen-Bradley.
   b. Cutler-Hammer.
   c. Approved equal.

D. Timers:
1. Timing relays:
   a. Solid-state, pulse count type using a high frequency RC oscillator and integrated circuit counter for timing.
   b. Do not use electrolytic capacitors in the timing circuits.
   c. Time delays from 0.1 seconds to 48 hours, adjustable over a 20:1 range.
   d. Timing adjustment: Knob adjustment on the top of the unit.
   e. On-delay, off-delay, and single-shot timing models.
   f. Reset in 0.03 seconds or less.
   g. Timer accuracy: Plus or minus 2.0 percent under normal conditions.
   h. Two NEMA form-C timed contacts.
   i. Acceptable manufacturer:
      1) Agastat, STA series.
      2) Agastat BTSAIISC with looking bail STAOOI if equal socket.
      3) Approved equal.
2. Motor-driven timers:
   a. Mounted in a one-piece molded case, permanently mounted and wired.
   b. Driven by a synchronous motor which starts timing when initiated by an external signal.
   c. Time settings: Made by turning a knob on the front of the dial.
   d. Neon pilot light visible from the front of the timer shall glow red when the timer motor is energized.
   e. Visual indication by a cycle progress pointer which advances to zero from the setting back to zero as time progresses.
   f. Two sets of "instantaneous" NEMA form-C contacts which actuate when the timing is initiated.
   g. One set of "delayed" NEMA form-C contacts which actuates when the unit has timed out.
   h. Reset: Unless otherwise indicated, when the timing cycle is completed, timer automatically resets.
   i. Acceptable manufacturer:
      1) Eagle Cycle-flex reset timer HP5 series.
      2) Automatic Timing Controls Series 305D.
      3) Approved equal.

2.03 MAGNETIC CONTACTORS

A. Motor Contactors:
1. Designed for continuous operation of induction motors at 600 volts or less at 60 Hz and comply with NEMA ICS 2-210.
2. Minimum size: Unless otherwise indicated, NEMA size 1.
3. Supply with a normally open auxiliary contact for use as a hold-in contact as a minimum. Provide additional contacts as specified.
4. Coil voltage, frequency, and number of poles as specified.

2.04 SAFETY DISCONNECT SWITCHES

A. Heavy-duty, non-fusible, safety type rated 600 volts AC.

B. Enclosures:
1. Indoor: Unless otherwise indicated, NEMA 12.
2. Outdoor or corrosive areas: NEMA 4X, nonmetallic.
3. Hazardous areas: NEMA 7.

4. Classified areas: Suitable for the specified classification.

C. Operating Handle: Capable of being padlocked in the "off" position.

D. Operator: Positive, quick-make, quick-break mechanism.

E. Switch Mechanisms: One auxiliary contact rated B150, per NEMA ICS 2-125, that opens before the switchblades.

F. Horsepower rated for motors and comply with NEMA KS 1.

G. Defeatable door interlocks that prevent the door from opening when the operating handle is in the "on" position.

H. Line terminal shields.

I. Acceptable Manufacturer:
   1. Westinghouse Type H-600.
   2. General Electric Mill Duty Type TH.
   3. Approved equal.

2.05 OVERCURRENT PROTECTION

A. Circuit Breakers:
   1. Thermal magnetic, molded-case type with the ampere rating as specified.
   2. Unless otherwise indicated, circuit breaker interrupting rating:
      a. 10,000 amperes symmetrical for service at 240 volts and below.
      b. 22,000 amperes symmetrical for service above 240 volts.

2.06 ELAPSED TIME INDICATORS

A. Panel-mounted, non-resettable, six digit, hour indicator, rated 120 volts AC, 60 Hz.

2.07 TEMPERATURE TRIP RELAY

A. Capable of monitoring electric motor winding temperatures based on input signals from three 10 ohm copper 3-wire resistance temperature detectors (RTD).

B. Equipped with light emitting diodes (LED) to indicate which RTD is at the highest temperature. The highest temperature shall be internally compared to two trip settings to trip SPDT output relays. The output relays shall be settable at different temperatures and shall de-energize at the set point on increasing temperature.

C. Relay Contact Minimum Rating: 240 VAC, 5A non-inductive.

D. Output Signal: 0 to 1 mA, linearly proportional to the temperature of the hottest RTD.

E. Powered by 120 VAC, 60 Hz.

F. Acceptable Manufacturer:
   1. Crompton 256-PRBU.
   2. Approved equal.

2.08 SELECTOR SWITCHES

A. For Fans: 600V, heavy duty two-position, four-circuit, suitable for Class 1, Division 2 area.

B. Indicating plate markings as follows: “Enable-Stop.”

C. Acceptable Manufacturer:
   1. Crouse-Hinds EDS 21272.
   2. Approved equal.

2.09 NAMEPLATES

A. For all control stations, relays, timers, motor contactors and disconnect switches: Per Section 16010.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 16346

PRIMARY SWITCH GEAR ASSEMBLY TO 15 Kv

PART 1 GENERAL

1.01 DESCRIPTION

A. Supply primary switchgear, including the following major components:
   1. Enclosure
   2. Circuit breakers
   3. Busbars
   4. Meters
   5. Protective relays
   6. Small wiring and terminations
   7. Separate battery and charger

B. Switchgear shall be provided as a coordinated component of the overall engine generators package under the unit responsibility requirement specified in section 11093.

1.02 REFERENCE STANDARDS

A. Conform to the following reference standards in accordance with Section 01090:

Reference	Title
ANSI C37.06	Preferred Ratings and Related Required Capabilities for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
ANSI C37.09	Test Procedure for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
ANSI C37.9	Test Code for AC High Voltage Circuit Breakers Rated on Total Current Basis
ANSI C37.20	Switchgear Assemblies Including Metal Enclosed Bus

1.03 SUBMITTALS FOR REVIEW

A. Provide shop drawings for review in one complete submittal in accordance with Section 01300.

B. Prepare all drawings using AutoCAD Release 2000.

C. Provide all drawings to the Project Representative as hard copy plot and on compact disk for importing to the project documentation drawings.

D. Provide:
   1. Single and three line schematic diagrams.
   2. AC and DC Schematic diagrams. Diagrams to show full circuit breaker controls specific to this contract.
   3. Cubicle wiring and interconnection diagrams.
   4. Front panel layout.
   5. Section views.
   6. Bill of materials.
   7. Floor anchoring method and dimensioned foundation template.
   8. Dimensioned cable entry and exit locations.
   9. Dimensioned cable termination and pothead height.
   10. Dimensioned position and size of busbars and details of provision for extension.
   11. Dimensioned positions of main connections, including air clearances and support insulators.
   12. Layout of internal and front panel components suitably identified.
   13. Time current characteristics curves of protection devices.

14. Maximum symmetrical interrupting rating, three second short time current capability and closing and latching capability, all at 13.8 kV, for main incoming and tie circuit breakers, feeder circuit breakers and busbars, including taps to all cubicles.
15. Seismic calculations.
16. Production test reports for each shipping section, as defined by ANSI standard C37.20.2, which includes dielectric, mechanical operation, instrument transformer case ground, and electrical operation and control wiring.
17. Test reports for the circuit breakers, relays, instruments and the type tests to confirm that all cubicles meet or exceed the test criteria of ANSI Standard 37.09, Standard Test Procedure for AC High Voltage Circuit Breakers, ANSI Standard 37.9, Standard Test Code for Power Circuit Breakers, ANSI Standard C37.20, Switchgear Assemblies.
18. Submit shop drawings to all inspection authorities having jurisdiction for the proposed installation site and obtain certification that equipment meets their requirements, before submission of drawings to Project Representative.
19. Provide any interim submittals required for coordination or approval of Seattle City Light.
20. Recommended protective relay setting requirements pertinent to the protection of equipment provided under this contract.
21. Applicable operation and maintenance information on an item-by-item basis in accordance with Section 01730. Operation and maintenance information shall be provided at the time of equipment, device, or material site delivery, or at a certain stage of project completion as required by Section 01730, whichever is the earlier.
22. See Sections 11093 and 16010 for additional submittals requirements.

1.04 NOT USED

1.05 COORDINATION

A. Coordinate time current characteristics of protective relays based on the protective relay coordination study done by others under the Installation Contract.

1.06 SHIPMENT, PROTECTION, AND STORAGE

A. Ship and store switchgear assembly in upright position.

B. Store in weather protected, warm, dry enclosure.

C. Keep doors locked and protect instruments and protective relays from damage and dust.

D. Ship channel base sills, anchoring devices in advance of switchgear.

PART 2 PRODUCTS

2.01 The switchgear supplier shall be experienced in supporting the design of cogeneration switchgear and shall be Russelectric Company, ASCO (Automatic Switch Company), General Electric, Cutler Hammer, Thomson Technology Inc., Siemens or equal.

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2.02 CAPACITIES AND PERFORMANCE

A. Primary switchgear shall be suitable for use in an indoor environment, within a sewage treatment facility where ambient temperatures range from 5°C to +40°C, at an elevation not exceeding 1000 m above sea level.

B. Switchgear will be supplied from a 13.8 kV, 3 phase, three wire, 60 Hz solid grounded (Seattle City Light source) and high resistance grounded generators system, interrupting capacity 500 MVA, BIL 95 kV.

2.03 EQUIPMENT COMPONENTS

A. GENERAL: Design, manufacture, and test switchgear in accordance with the latest edition of the reference standards listed above.

B. PRIMARY ENCLOSURE:
1. Metalclad.
2. Free standing.
3. Floor mounted.
4. Dead front.
5. NEMA indoor enclosure.
6. Multi cubicle unit.
7. Suitable for seismic zone 3
8. All enclosures shall be completely wrap around such that when two structures are bolted together, two thicknesses of steel will separate the two enclosed spaces.
9. Overall dimensions to not exceed 264 inches wide, 100 inches high, 96 inches deep.
10. Provide unit construction capable of accommodating back-to-back PTs in a section.
11. Provide a racking mechanism to move the circuit breaker from "Disconnected" through "Test" to "Connected" position and vice versa, with compartment door closed at all times.
12. Provide interlocks to ensure circuit breaker is in the open position during racking operation.
13. Provide positive stops in the "Disconnected" and "Test" positions.
14. Primary contacts shall be recessed in tracking resistant glass polyester insulated bushings, sized to provide space for mounting two (2) ANSI standard accuracy class current transformers per phase.
15. Auxiliary contacts shall remain engaged as the circuit breaker is racked to the "Test" and "Connected" positions. Provide a cord extension to allow testing breaker out of switchgear.
16. Ventilating louvers.
17. Use non corrosive bolts and hardware.
18. Access from front and back.
19. 4 inch steel channel sills for base mounting in single length common for multi cubicle switchboard.
20. Full height outer door, gasketted, hinges on left side, provision for multiple padlocking.
21. Three point latch, stops, to open at least 135 degrees.
22. Inner doors to open at least 90 degrees.
23. Hinge all doors on same side.
24. Gaskets on removable covers.
25. Removable cover bolts not accessible from outside of cubicle.
26. Provision for future extension on each end of switchgear.
27. Metal pocket on inside surface of door to accommodate drawing and diagram prints.
28. Provision for padlocking circuit breaker in "Disconnected" position, only.
29. Minimum 35 watt fluorescent light in each cubicle low voltage control section, with switch.
30. Duplex receptacle: 120 V, single phase, 60 Hz, U ground, in each cubicle low voltage control section.
31. Interposing control relays: Relays for control interface between external 120 VAC control and switchgear.

C. BUS BARS:
1. Three phase insulated busbars, continuous current rating as shown extending full length of switchgear line up, suitably supported on insulators.
2. Provide main connections between busbars and major switching components rated to match at least the continuous current rating of the major switching components.
3. High conductivity, tin-plated, copper for main busbars and main connections.
4. Provision for extension of busbars at each end of switchgear line up without need for further drilling or field preparation of the busbars or the cubicles.
5. Brace busbar system to withstand stresses resulting from short circuit currents specified.
6. Silver surfaced joints, secured with non corrosive bolts and washers, tightened with torque wrench in accordance with manufacturer's recommendations.
7. Identify phases of busbars by suitable marking.
8. Busbar connectors for switchgear line up shipping sections.

D. GROUNDING:

1. Copper ground bus extending full length of switchgear line up and situated close to base of each cubicle, ground bus size for the specified fault level.
2. Lugs at each end of ground busbar for size 4/0 AWG grounding cable.
3. Bond non current carrying parts, including switchgear framework, enclosure and bases to ground bus.

E. CIRCUIT BREAKER DESIGN:
1. Indoor vacuum circuit breaker, 3 pole, single break, power operated, draw out type, sized as indicated.
2. Circuit breakers to comprise three vacuum interrupter pole units with spring charged stored energy mechanism, suitable for manual charging on loss of power.
3. Each circuit breaker to have the following standard features:
   a. Spring charge motor.
   b. Closing coil.
   c. MOC 8 NO contacts, 10 NC contacts, additional contacts as required per section 11093.
   d. Anti pumping relay.
   e. Shunt trip coil.
   f. Manual charge handle.
   g. TOC 1 - NC contact (breaker racked out).
   h. Maximum time to open: 50 ms.
   i. Maximum time to close: 70 ms.
4. Provide contact erosion indicators.

F. CIRCUIT BREAKER – GENERAL:
1. Circuit breaker operating mechanism: 125 VDC solenoid closing and 125 VDC shunt trip.
2. Circuit breaker interrupting capacity: 500 MVA at 13.8 kV.
3. Provide local/remote selector switches as required and close and trip actuators per switchgear section for tripping and closing the circuit breaker.
4. Provide interposing relays for remote close and trip 120 VAC coil and suitable 125 VDC contacts.
5. Auxiliaries: Status light: open - green, close - red.
6. All circuit breakers of same rating shall be interchangeable in any circuit breaker location in the switchgear.

G. GENERATOR MULTIFUNCTION RELAYS:
1. Generator circuit breaker tripping devices, solid state and including the following:
   a. Device No. 50 Instantaneous overcurrent relay.
   b. Device No. 50N Instantaneous ground fault relay
   c. Device No. 51V Voltage restrained time overcurrent relay
   d. Device No. 32 Reverse power relay.
   e. Device No. 59 Overvoltage relay.
   f. Device No. 27 Undervoltage relay.
   g. Device No. 60 Voltage comparison relay
   h. Device No. 67 Directional overcurrent relay.
   i. Device No. 86 Locking out relay.
   j. Device No. 40 Loss of field excitation relay.
   k. Device No. 51G Ground fault relay.
   l. Device No. 46 Negative sequence relay.
   m. Device No. 81 O/U Over and under frequency protection
   n. Device No. 87G Generator differential relay.
   o. Device No. 59N over voltage relay to detect ground faults with the high resistance grounding.
   p. Device No 25 sync check relaying per specification section 11093.
2. Provide draw out case and test switch block with cover.
3. Supply any additional auxiliary relays, transformers and/or other devices to provide a complete and functional protection system as shown or specified.
4. Where the above functions are not fully available in a single multifunction relay, these additional features may be provided in separate unit relays.
5. Minimum six programmable contact outputs for alarm and trip purposes.

6. Provide generator protection relay common warning and trip alarms and coordinate with equipment specified in section 11093 such that indication is provided at the local engine panel, engine generator panel, system panel and for output to the SCS.
7. Multifunction relays to be GE Multlin DGP, Basler BE1-GPS100 or equal.

H. SWITCHGEAR MAIN AND FEEDER BREAKERS PROTECTIVE RELAYS:
1. Main breaker tripping devices, solid state as shown on drawings and typically including the following:
   a. Device No. 50/51 Instantaneous and time overcurrent relay.
   b. Device No. 67 Directional Overcurrent relay.
   c. Device No. 67N Directional ground fault relay
   d. Device No. 86 Locking out relay.
   e. Device No. 51G Ground fault relay.
   f. Device No. 25 Sync check relay
2. Provide draw out case and test switch block with cover.
3. Supply any additional auxiliary relays, transformers and/or other devices to provide a complete and functional protection system as shown.
4. Where the above functions are not fully available in a single multifunction relay, these additional features may be provided in separate unit relays
5. Minimum six programmable contact outputs for alarm and trip purposes
6. Provide protection relay common warning and trip alarms and coordinate with equipment specified in section 11093 such that indication is provided at the local engine panel, engine generator panel, system panel and for output to the SCS.
7. The feeder circuit breaker for the station auxiliaries transformer shall include functions 50, 51, 50N and 86.
8. Multifunction relays to be GE Multlin 750 or equal.

I. PROTECTION RELAY SOFTWARE:
1. Where any licensed software is required in conjunction with the protective relays specified in this section, provide a licensed copy for the County.

J. AUXILIARY CUBICLE: Provide cradles or drawers for fused voltage transformers and control transformers which automatically disconnect and ground the component in the withdrawn position.

K. INTERLOCK SYSTEMS: Key interlocks mounted in switchgear so that interlocks cannot be removed when operating circuit breaker is in closed position, if shown on the drawings.

L. PRIMARY INSTRUMENTS: Components: microprocessor based monitoring unit and the necessary instrument transformers.

M. INSTRUMENT TRANSFORMERS:
1. Potential transformers to be dry type, compound filled for indoor use, with the following characteristics:
   a. Nominal voltage class as indicated.
   b. Rated frequency 60 Hz.
   c. Basic impulse level 95 kV.
   d. Voltage ratio as required by instrument.
   e. Accuracy rating to suit instruments and relays.
   f. Corona free construction. Production partial discharge test at 125% of rated voltage not to exceed maximum discharge of 30 picocoulombs.
2. Potential transformers fused with separate fuse block.
3. Provide draw out feature for potential transformers.
4. Primary and secondary windings grounded in draw out position.
5. Current transformers to be dry type compound filled for indoor use with the following characteristics:
   a. Bar type construction.
   b. Nominal voltage class as indicated.
   c. Rated frequency 60 Hz.
   d. Basic impulse level 95 kV.
   e. Accuracy rating to suit instruments and relays.

f. Rated primary and secondary current as required by instruments and relays.

6. Positive action automatic short circuiting device in the secondary terminals installed and tested in the switchgear at 36 kV for 1 minute, 60 Hz.
7. Provide mounting brackets for all instrument transformers, as required.

N. WIRING:
1. Provide minimum size No. 14 AWG stranded copper extra flexible conductor Type SIS thermoplastic insulated wire for potential and control connections.
2. Provide minimum size No. 10 AWG stranded copper extra flexible conductor Type SIS thermo plastic insulated wire for current transformer connections.
3. Identify all wiring at both ends using embossed plastic marker sleeves.

O. EQUIPMENT IDENTIFICATION:
1. Nameplates:
   a. Switchgear designation: label 6 inches wide plate, 2 inches high, engraved:

      "13.8 kV Switchgear 717-MSG01"

   b. Individual cubicle designations: labels 4" wide plate, 2" high with designations to be provided by the Project Representative.
   c. Device designation: labels – 3" wide plate, 1" high, front of panel and interior of panel.

P. WARNING SIGNS: Provide warning signs in accordance with the WAC and NEC.

Q. STATION BATTERY AND CHARGER:
1. Provide a 125 Volt NiCad battery package for closing and tripping power for the complete line up of 15.0 kV switchgear.
2. Provide additional capacity for all future feeder circuit breakers and for any controls requirements associated with the cogeneration controls.
3. Provide a battery charger for the above battery, 120 VAC single-phase supply, complete with control and alarm features (local and remote) to maintain the battery in a functional condition at all times.
4. Provide enclosure for battery charger with hinged front only access door(s).
5. Provide seismic zone three rated battery rack for batteries.
6. Tie battery charger alarms and dc voltage status monitoring to the cogeneration alarms for indication at the local engine panel, engine generator panel, system panel and for output to the SCS.

R. ACCESSORIES:
1. Provide a grounding truck.
2. Provide lever for manually charging circuit breaker closing springs.
3. Provide crank handle to move circuit breaker between "connected," "test" and "disconnected" positions.
4. Provide set of circuit breaker rail extensions and clamps.
5. Provide test cabinet and jumper cable for operating circuit breaker when removed from switchgear.
6. Provide set of test plugs for switchboard relays and instruments.

S. SEATTLE CITY LIGHT METER SECTION:
1. Provide an empty section of switchgear in the lineup for future use for a Seattle City Light metering section.
2. Section shall include necessary provisions to accommodate future SCL CT's and PT's and metering.
3. Section shall be 48 inches wide or as required by SCL.

T. OTHER SWITCHGEAR SECTIONS:
1. Provide an empty section of switchgear in the lineup for the future third generator.
2. The future generator section shall be equipped with breaker mounting hardware as required to accommodate installation of the future circuit breaker and controls .
3. Provide feeder breaker and feeder protection relay for the station auxiliaries transformer which will be provided under the Installation Contract.

U. POWER MONITOR METERS:
   1. Provide power monitor meters for each generator as specified in section 11093.
   2. Provide an additional power monitor meter to monitor the combined generators power output
   3. Power monitor meters shall monitor functions specified in section 11093. Monitored values shall be made available for input to the cogeneration system controls per section 11093 as required and for output to the plant supervisory control system (SCS).
   4. Provide a power monitor meter for the switchgear main breaker for local indication only.
   5. Power monitor meters shall be Siemens 9350 with Ethernet option as specified in section 11093.

2.04 PROTECTIVE COATINGS

A. Apply finishes in accordance with Section 16010.

B. Supply 10 spray cans touch up paint of each color used in the switchgear manufacture.

2.05 SPARE PARTS

A. Provide maintenance materials in accordance with Section 01730.

2.06 SPACE REQUIREMENTS

A. Maximum dimensions for equipment are specified in this section based on manufacturers' typical published dimensions. Equipment exceeding maximum dimensions shown will be rejected unless specifically authorized in writing by the Project Representative per the procedure described in the following paragraph. It is the responsibility of the vendor under this section to insure that the overall maximum allowable dimensions of the equipment lineup will not be exceeded due to spatial requirements of incorporated components.

B. If more space is required for the switchgear, including spaces than have been allowed for on the drawings, submit a dimensioned layout sketch of the assembly at the time of tender.

C. Where the equipment configuration shown on the plan drawings is critical to the overall installation, this is indicated by note on the drawing. In such cases, no deviation will be allowed from the equipment layout shown without written authorization from the Project Representative. This authorization will be based on confirmation from the Contractor that all conflicts resulting from the revised equipment layout have been addressed to the satisfaction of the Owner.

2.07 FACTORY TESTING

A. Project Representative will attend in plant inspection.

B. Provide manufacturer's type test certificates indicating switchgear cubicles and components tested as integrated assembly.

C. Project Representative may witness standard factory testing of complete switchgear assembly, including verification of frame grounding, operation of safety shutters, interlocks, alignment of primary and secondary plugs, circuit breakers, relays and controls.

D. Perform over potential and corona extinction voltage tests for primary and secondary connections.

E. Notify Project Representative in writing, 10 working days prior to testing, that equipment is ready for inspection.

F. Submit to Project Representative test procedures, at least 20 working days prior to testing.

G. Submit six (6) copies of production test results to Project Representative two weeks before equipment is shipped from factory.

H. Include reviewed test results in operating manuals.

I. Quote all costs applicable to witness testing.

J. Provide a typical cell test report clearly showing that the cell has passed the requirements of this test procedure at a minimum of 25 kA at 12.5 kV.

K. If such test results are not available then the manufacturer will take the necessary steps in order to provide them, at no expense to the purchaser.

L. In the presence of the Project Representative, verify the wiring within the switchgear assembly. Each input and output function, control functions, circuit breaker interlocks, and sync check functions shall be demonstrated and recorded.

2.08 COORDINATION WITH OTHERS

A. Protection relays settings will be set up by others under the Installation Contract. Provide all required documentation that will be required by the Installation Contractor for programming relays provided here.

B. Any required information for programming settings of relays specific to the equipment being furnished under this contract shall be provided for the Installation Contractor.

PART 3 PRODUCTS

3.01 INSTALLATION

A. Installation will be by an Installation Contractor under a separate contract. Provide on site support, minimum 2 days, and as required to verify installation according to these and any other installation guidelines for this equipment.

3.02 TESTING

A. Testing will be performed by the Installation Contractor in accordance with manufacturer recommendations and NETA guidelines. Provide on site support for this testing as required. Minimum on site support shall include 2 days on site. See Section 01660 for further requirements for field testing.

END OF SECTION

SECTION 16010

ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 REQUIREMENTS

A. GENERAL REQUIREMENTS: This section specifies general requirements common to sections of Division 16 for electrical work. Detailed requirements for specific electrical items are specified in other sections but are subject to the general requirements of this section. The electrical drawings and schedules included in this specification are functional in nature and do not specify exact locations of equipment or equipment terminations.

1.02 REFERENCE STANDARDS

A. Conform to reference standards in accordance with Section 01090.
   1. REFERENCES: This section contains references to the following documents. They are a part of these documents as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ANSI A58.1	Minimum Design Loads for Buildings and Other Structures
NFPA 70	National Electrical Code (NEC)
UBC	Uniform Building Code

1.03 DEFINITIONS

A. Elementary or Schematic Diagram: A schematic (elementary) diagram shows, by means of graphic symbols, the electrical connections and functions of a specific circuit arrangement. The schematic diagram facilitates tracing the circuit and its functions without regard to the actual physical size, shape, or location of the component devices or parts.

B. Single-Line Diagram: A single-line diagram shows, by means of single lines and graphical symbols, the course of an electrical circuit or system of circuits and the components, devices or parts used therein. Physical relationships are usually disregarded.

C. Block Diagram: A block diagram is a diagram of a system, instrument, computer, or program in which selected portions are represented by annotated boxes and interconnecting lines. Cabling requirements indicating the number and type of conductors required for interconnection are to be included.

D. Wiring Diagram or Connection System: A wiring or connection diagram includes all of the devices in a system and shows their physical relationship to each other including terminals and interconnecting wiring in an assembly. This diagram may be (a) in a form showing interconnecting wiring only by terminal designation (wireless diagram), or (b) by panel layout diagram showing the physical location of devices plus the elementary diagram.

E. Interconnecting Wiring Diagram: An Interconnecting Wiring Diagram (IWD) shows all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. References shall be shown to all connection diagrams which interface to the IWD. IWD to be of the continuous line type. Bundled wires shall be shown as a single line with the direction of entry/exit of the individual wires clearly shown. Wireless diagrams and wire lists are not acceptable. Each wire identification as actually installed shall be shown. The wire identification for each end of the same wire shall be identical. All devices and equipment shall be identified. Terminal blocks shall be shown as actually installed and identified in the equipment complete with individual terminal identification. All jumpers, shielding and grounding termination details not shown on the equipment connection diagrams shall be shown on the interconnection diagrams. Wires or jumpers shown on the equipment connection diagrams shall not be shown again on the interconnection diagram.

F. Arrangement, Layout, or Outline Drawings: An arrangement, layout, or outline drawing is one which shows the physical space and mounting requirements of a piece of equipment. It may also indicate ventilation requirements and space provided for connections or the location to which connections are to be made.

1.04 SERVICE, OPERATION AND START-UP

A. Refer to Section 11093 and Section 01660.

1.05 MATERIALS AND EQUIPMENT

A. Except as otherwise noted, all material and equipment of the same or a similar type shall be of the same manufacturer throughout the work. Standard production materials shall be used wherever possible.

B. Electrical equipment and materials shall be listed for the purpose for which they are to be used, by an independent testing laboratory. Three such organizations are Underwriters Laboratories (UL), Canadian Standards Association (CSA), and Electrical Testing Laboratories (ETL). Independent testing laboratory shall be acceptable to the inspection authority having jurisdiction.

C. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the product may be required by the inspection authority, to undergo a special inspection. All costs and expenses incurred for such inspections shall be included in the original contract price.

D. Factory assemble control panels and component assemblies.

E. Where specified in the individual product specification section, perform factory tests at the place of fabrication on completion of manufacture or assembly. Bear the costs of factory tests.

1.06 SUBMITTALS

A. Provide the following submittals in accordance with Section 01300:
   1. Catalog cuts of equipment, devices, and materials requested by the individual specification sections. Catalog information shall include technical specifications and application information, including ratings, range, weight, accuracy, etc. Edit catalog cuts to show only the items, model numbers, and information which apply.
   2. Assemble catalog cuts in a folder. Each folder shall contain a cover sheet, indexed by item, and cross-referenced to the appropriate specification paragraph.
   3. A copy of the applicable specification section with addenda updates, and all referenced sections with addenda updates, marked to show deviations.
   4. Nameplate schedules.
   5. Applicable operation and maintenance information on an item-by-item basis in accordance with Section 01730. Operation and maintenance information shall be provided at the time of equipment, device, or material site delivery, or at a certain stage of project completion as required by Section 01730, whichever is the earlier. Reduce full-size drawings to (11 inches x 17 inches).
   6. Test documentation per Section 01660
   7. Painting and coating information including colors, dry film thickness and coating system.
   8. See Section 11093 for additional submittal requirements.

1.07 NOT USED.

1.08 DRAWINGS

A. Where information is to be provided on drawings as part of the specified work, prepare such drawings on (22-inch x 34-inch) polyester plastic (Mylar) drafting media complete with borders and title blocks clearly identifying project name, equipment and the scope of the drawing. Drawing quality and size of

presentation shall be such as to permit 50 percent reduction of such drawings for insertion in operation and maintenance manuals.

1.09 RECORD DOCUMENTS

A. Not used.

1.10 PROJECT/SITE CONDITIONS

A. General: Unless otherwise specified, size and derate equipment and materials for the ambient site conditions, but not less than ambient temperature of 40°C at an elevation ranging from sea level to 900 m without exceeding the manufacturer's stated tolerances.

B. Seismic
   1. Electrical equipment and supports shall be braced in accordance with UBC for Seismic Zone 3. The Supply Contractor shall provide calculations for overturning moment and design of the embedded anchors for securing free-standing equipment to the building structure.
   2. Provide details on seismic anchoring requirements.

1.11 FINISHES

A. Items of fabricated metal which have not been painted as part of a mass production procedure are to be treated as follows:
   1. Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish.
   2. Paint outdoor electrical equipment FS 26463 (ANSI 61) light grey, epoxy.
   3. Paint indoor switchgear and distribution enclosures FS 26463 (ANSI 61) light grey, enamel.
   4. If acceptable to Project Representative, clean and touch-up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
   5. Field-clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting and finish with two coats of finish.
   6. If acceptable to Project Representative, apply Galvacon touch-up paint to damaged portions of galvanized surfaces and threads.

1.12 NAMEPLATES

A. Laminated phenolic plastic.

B. Nominal Sizes: 3/4 inch high by 2 inches long for small equipment, 2 inch high by 6 inches long for large equipment.

C. Black backgrounds with 3/16-inch white letters.

D. If abbreviations are required because of space limitations, submit to the Project Representative prior to manufacture.

E. Fastened using self-tapping stainless steel screws. The use of adhesives will not be permitted on the outside of enclosures.

1.13 ELECTRICAL NUMBERING SYSTEMS

A. Conductor Numbers: When factory-wired equipment has terminal numbers different than the conductor numbers shown on the control diagrams, show both numbers on the interconnection diagram, and fasten a copy of the interconnection diagram to the inside of the equipment cabinet.

1.14 INDICATING LAMP COLORS

A. Unless otherwise noted, the following color code and inscriptions shall be followed for service legends and lens colors of all indicating lights:

FUNCTION	INSCRIPTION	COLOR
BREAKER OPEN	OPEN	GREEN
BREAKER CLOSED	CLOSED	RED
BREAKER TRIPPED	TRIP	AMBER
ON	ON	RED
OFF	OFF	GREEN
OPEN	OPEN	RED
CLOSED	CLOSED	GREEN
LOW	LOW	GREEN
FAIL	FAIL	RED
HIGH	HIGH	AMBER
AUTO	AUTO	WHITE
MANUAL	MANUAL	YELLOW
LOCAL	LOCAL	WHITE
REMOTE	REMOTE	AMBER
CTRL	CONTROL POWER	WHITE
RUN	RUN	RED
RESET	RESET	WHITE
TROUBLE	TROUBLE	RED
READY	READY	GREEN

B. Where letting is used on the lens the lettering color shall be;
   1. Black on white, amber, and yellow lenses.
   2. White on red and green lenses.

1.15 PUSH BUTTON COLORS

A. Unless otherwise noted, the following color code and inscriptions shall be followed for all pushbuttons:

FUNCTION	INSCRIPTION	COLOR
RESET	RESET	RED
EMERGENCY STOP	E-STOP	RED
ALL OTHERS	AS REQUIRED	BLACK

1.16 CONDUCTOR TERMINATIONS

A. Lugs, terminals, screws used for termination of conductors to be suitable for copper or aluminum conductors as applicable.

B. Use tin-plated lugs and terminals with nylon insulating materials.

C. Unless otherwise specified, use pan head terminal screws. Terminal blocks shall be Wiedmuller model WPU4 or equal.

D. Provide terminals with integral marking strips, permanently identified with the connecting wire numbers as shown on the drawings.

E. Minimum ratings for terminal blocks:
   1. 208 and 600 volts power circuits: not less than current rating of conductor and not less than 600 VAC.
   2. C-circuits (control and/or power 120V or less) and Analog circuits: not less than 20 A and not less than 600 VAC.

1.17 EQUIPMENT BASE TEMPLATES

A. For all major electrical equipment, provide an equipment base template for location of equipment anchor bolts to be embedded in concrete.

B. Provide access holes for the placement of grout or concrete, as applicable.

1.18 ACCEPTABLE MANUFACTURERS/PRODUCTS

A. Equipment lists included in the specifications may be in two parts:
   1. The "Design Standard" equipment item.
   2. "Acceptable Products" if specific items of equipment are specified or "Acceptable Manufacturers" if the equipment of a specific vendor is specified.

B. The design has been based on the Design Standard. Quality of workmanship, dimensions, operating protocol, basic materials, and ancillary services has been defined on this basis and incorporated in the design.

C. Listed Design Standard
   1. Where Acceptable Products or Acceptable Manufacturers have been listed after a Design Standard, these products or ranges of products have been recognized by the Project Representative as being capable of meeting the basic functional requirements of the equipment, but may not be the same as the Design Standard in detail.
   2. Provide all ancillary services, material upgrades, etc. as necessary to satisfy the quality requirements defined by the Design Standard.
   3. Make all minor changes as necessary to suit the requirements of the Acceptable Products or Acceptable Manufacturers.

D. No Listed Design Standards
   1. Where Acceptable Products or Acceptable Manufacturers have been listed, but no Design Standard is listed, these products or ranges of products have been recognized by the Project Representative as being capable of meeting the basic functional requirements of the equipment.
   2. Provide all ancillary services and minor modifications to arrangement, piping and/or electrical connections, etc. as necessary to suit the functional requirements of the equipment.

E. No additional payment will be made for revisions or alterations made to accommodate the equipment supplied.

1.19 TECHNICAL DATA

A. Provide the technical data required by the Project Representative to do a coordination study of the electrical protective devices for all equipment supplied under this contract.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 11093

LOW EMISSION COGENERATION ENGINE-GENERATOR SYSTEM FOR OPERATION ON DIGESTER GAS AND NATURAL GAS

PART 1 GENERAL

1.01 DESCRIPTION

A. This specification describes the functional requirements for the equipment comprising a complete multi-fuel, engine-generating system. The equipment described functionally in this specification shall be provided by the Supply Contractor who shall be responsible for including in their response to this request for proposals technical data and cost information regarding the design, supply schedule, installation supervision, testing, training and commissioning of the proposed equipment.

B. Equipment proposed shall include all necessary components of the complete generating system, including: engine-generators, medium voltage switchgear, exhaust silencers; heat recovery equipment; engine controls, generator controls, synchronizing controls, safety shutdown controls and auxiliary equipment suitable for prime power duty. Equipment proposed shall be suitable for permanent installation in an existing concrete building.

C. The equipment described in this section is to be delivered to the site or a storage location in Seattle and set in place by an Installation Contractor. The Installation Contractor will provide interconnecting piping, wiring, and otherwise install the equipment to the Supply Contractor's requirements.

1.02 REFERENCE STANDARDS

A. Conform to the following reference standards in accordance with Section 01090:

Reference	Title
AFBMA 11	Load Ratings and Fatigue Life for Roller Bearings.
AFBMA 9	Load Ratings and Fatigue Life for Ball Bearings.
AISI	Pocketbook of AISI Standard Steels.
ANSI B16.5	Pipe Flanges and Flanged Fittings.
ANSI C96.1	Temperature Measurement Thermocouples.
ANSI/IEEE	C37.90a, Surge Withstand Capability (SWC) Test.
ANSI/IEEE Standard 141	IEEE Recommended Practice for Electric Power Distribution for Industrial Plants, (Red Book).
ANSI/IEEE Standard 242	IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Plants, (Buff Book).
ANSI/IEEE Standard 446	IEEE Recommended Practice for Emergency and Standby Power for Industrial and Commercial Applications (Orange Book)
API 670	Non-contacting Vibration and Axial Position Monitoring System.
API 678	Accelerometer-Based Vibration Monitoring System.
ANSI/IEEE C37.101	IEEE Guide for Generator Ground Protection
ANSI/IEEE C37.102	IEEE Guide for AC Generator Protection.
ASME PT-17	Reciprocating Internal Combustion Engines, Performance Test Codes.
NEMA MG-1	National Electrical Manufacturers Association Standards.
NFPA 37	National Fire Protection Association Standard 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.

Reference	Title
SAMA PMC 5-10	Resistance Thermometers.
SAMA PMC 21-4	Temperature-Resistance Values for Resistance Thermometer Elements of Platinum, Nickel, and Copper.

1.03 SUBMITTALS

A. The Supply Contractor shall include in their Proposal the costs associated with developing and supplying the following submittals for review by the Project Representative.

B. PRELIMINARY SUBMITTAL: The Supply Contractor shall provide a preliminary submittal for review by the Project Representative within thirty (30) days after Notice to Proceed. The purpose of the preliminary submittal is: 1) to allow the Project Representative to review and provide comment on the proposed method of approach and equipment details prior to release of equipment for manufacturing and start of construction and 2) to confirm equipment configuration, size, weight and other details so that the installation design can proceed with reasonable certainty about equipment details and space needs. The following information shall be provided in one complete submittal in accordance with Section 01300.

1. Assignment of a specific electrical engineer and mechanical engineer to serve as a contact between the Supply Contractor and the Project Representative during the design and construction periods of the Installation Contract. The assigned electrical engineer and mechanical engineer shall provide design period services in the Project Representative's offices in Seattle for not less than two days each to work with the design team to explain the submittal information and answer the design team's questions. After the initial two-day meetings, remaining questions and coordination will be handled by mail, telephone, fax, and e-mail. These engineers must be experienced in the electrical and mechanical applications of the manufacturer's systems in similar situations. They must be able to answer questions with a minimum of support from the factory. The Supply Contractor shall schedule the engineers to arrive two weeks after the submittal arrives at the Project Representative's offices. If the Supply Contractor feels that additional coordination time is warranted prior to the submittal to clarify design details, indicate the proposed arrangements for this submittal. The assigned engineers must also be available for additional questions through email, fax, or telephone on an as needed basis during the design and construction periods of the Installation Contract.
2. General arrangement drawings (plans and sections) for the complete engine-generator set showing the location, size and other pertinent details of major electrical, piping and monitoring connections. Identify and provide details on requirements at each flexible connection to the engine or generator.
3. Complete descriptive information on the engine including the manufacturer, model, size, displacement, rotational speed, BMEP, weight, unbalanced forces and moments and complimentary descriptive literature.
4. An affidavit attesting to the qualifications of the Supply Contractor and acceptance of the unit responsibility.
5. A preliminary equipment list of proposed equipment.
6. Results of a torsional vibration analysis of the torsional mass-elastic system to determine the critical frequencies and the forced damped response of the engine-generator proposed. The submittal must identify any critical speeds, which must be avoided and the factor of safety of each element in the torsional system under normal and worst-case operation. The factor of safety shall not be less than 1.25. Worst-case operation may include but is not limited to: combustion failure in one or more cylinders, power imbalance in one or more cylinders. The engine manufacturer shall perform the analysis as delineated in the draft International Congress of Internal Combustion Engines (CIMAC), International Association of Classification Societies (IACS) rules, or submit an alternative method for review and approval by the Project Representative.
7. Documentation showing estimates of fuel consumption, heat rejection and emissions performance data based on fueling with sewage digester gas having a net lower heating value of 500 Btu/cu. ft. Calculations should show all fluid flow rates and temperatures, heat transfer rates, shaft torque, and power output at the proposed maximum continuous rating (MCR). The submittal should include engine fuel consumption reported in units of Btu/bhp-hr according to ASME Performance Test Codes (PTC-17). Emissions values should be reported in grams/bhp-hr as well as in concentrations (ppm). All emissions values are to be corrected to 15 percent oxygen.
8. Exhaust silencer performance data showing the pressure drop across the silencer at MCR on digester gas. Provide estimates of the sound attenuation at each octave band center frequency and the net (at the exhaust exit) exhaust noise at each octave band center frequency. Also, indicate the maximum allowable engine exhaust backpressure, in inches of water column at full

load and show how the silencer performance meets the requirements of Section 6-6 and Attachment 6-6-F.

9. Schematic piping and interconnect diagrams (P&ID) showing the proposed arrangements for all of the auxiliary systems including jacket water, cooling water, intake air, exhaust, crankcase vent, fuel gas supply, fuel oil service, lube oil service, lube oil storage and starting air as applicable. Schematic drawings should show estimates of fluid flows and temperatures based on the engine operating at the proposed MCR.
10. Complete descriptive information on the proposed synchronous generator including literature and technical data describing:
    a. Insulation details and "X, R" values for generator windings.
    b. Full generator system performance data including:
        1) Direct-axis subtransient, transient, and synchronous reactances.
        2) Quadrature-axis subtransient, transient, and synchronous reactances.
        3) Direct-axis and quadrature-axis subtransient and transient time constants.
        4) Excitation system time constants and limits.
        5) Excitation capability curve
        6) Balanced and unbalanced fault decrement curves relative to generator capability curve.
        7) Generator harmonics spectrum information
11. Documentation showing physical sizes and clearance requirements for proposed switchgear and control panels required as part of the system for local and remote control of the engine-generator equipment. Also include a preliminary listing of components located in the control panels in sufficient detail to indicate the proposed locations for all control system components.
12. Control and electrical system control block diagram indicating the proposed arrangement and interconnection of the engine and generator control panels and components. This block diagram is to include the interconnecting wiring requirements for the supplied system to define all required field wiring that will need to be provided by the Installation Contractor under the installation contract. Provide sufficient information to indicate the type or class of cabling required. The Supply Contractor is to note that the information provided in this submittal will be used to establish the scope of supply and installation work for the Installation Contractor under the installation contract. The supply and installation of additional wiring that may be required in the construction phase that is not a result of a change in the control system scope shall be the responsibility of the Supply Contractor under this Contract.
13. A detailed input-output (I/O) list indicating all discrete and analog value interfaces with the external system controls. This listing should be complementary to the information provided under the requirements of the preceding paragraph.
14. Equipment and instrument tag numbers will be assigned by King County for all instruments, primary elements, process switches, etc. that are furnished in this Contract. Provide a complete listing of these devices in a tabular format.
15. Performance data showing the noise performance of all waste heat radiators. Provide sound pressure levels for each radiator at each octave band center frequency at 25 feet. Show how the radiator noise performance meets the requirements of Section 6-6 and Attachment 6-8.6.
16. Switchgear single line diagrams, elevations and interconnect wiring requirements.
17. Certification of the electrical protection scheme by the engine-generator manufacturer, as required by 11093-1.04 E.
18. Provide information that indicates the level of support that will be needed from the Installation Contractor for all testing activities for which the Supply Contractor is responsible, as specified in Section 01660. This information will be used to define the level of effort that the Installation Contractor needs to include in their bid for support of the Supply Contractor for startup and testing. This information shall be listed by testing function.

C. FINAL SUBMITTAL: In addition to the submittals specified in Section 11000, The Supply Contractor shall provide, in accordance with Section 01300, a final submittal for review by the Project Representative prior to construction. The purpose of the final submittal is to allow the Project Representative to review and provide comment prior to equipment installation. Information provided in the final submittal will be used by the Installation Contractor to develop shop drawings. The following information shall be provided in one complete submittal in accordance with Section 01300.
    1. All information previously submitted during the preliminary submittal, modified as required to incorporate comments provided by the Project Representative. Include final engine make, model,

size, weight, and complete descriptive data. All modifications to previously submitted information shall be clearly flagged to allow expedited review.

2. Final equipment list.
3. Proposed factory testing schedule.
4. Shipment and storage instructions.
5. The credentials and certification of the testing laboratory proposed for calibration of all test equipment.
6. Outline installation drawings (plans and sections) for complete engine-generator set showing the location, size and other pertinent details of each electrical, piping, and monitoring connection. Provide physical details on requirements at each flexible connection to the engine or generator.
7. Final heat and mass balance data showing sewage digester gas (500 Btu/cu. ft., LHV) consumption, all fluid flow rates and temperatures, heat transfer rates, shaft torque and power output at the continuous rating.
8. Complete descriptive information in sufficient technical detail to verify the proposed equipment meets the functional requirements of this specification for the following:
   a. Starting system, including starter, start sequence controller, and control system.
   b. Control power supplies including charger and batteries.
   c. Governing system, including actuator, and load sharing & speed controls.
   d. Synchronizing controls including automatic and manual synchronizing controls.
   e. Excitation controls including exciter, voltage regulator and VAR/pf controls.
9. Complete system interconnecting wiring diagrams as defined in Section 16010. These are to be drawn in accordance with the requirements of Section 17000. Provide interconnection diagrams for all subsystems as described in Section 11093 2.07 and the overall system.
10. Complete system elementary and loop diagrams and wiring diagrams as defined in Section 17000. These are to be drawn in accordance with the requirements of Section 17000.
11. Complete process and instrumentation diagrams for all controls included in this system. P&ID's are to be drawn using ISA symbols in accordance with Section 17000. All primary elements, instruments, monitored variables; indicators, alarms, switches, system I/O and control devices are to be included. Indicate signal routing and King County's assigned tags for all control hardware.
12. Complete wiring diagrams for the generator, generator protection system, and excitation systems, showing wiring and terminal identification conventions.
13. Complete wiring diagrams and panel face layout drawings for switchgear, system master, engine-generator, synchronizing, and local engine control panels showing wiring and terminal identification conventions. Complete parts list, and specifications for components of the control panels. Include connection requirements for equipment included by others.
14. Detailed input-output list indicating all discrete and analog value interfaces with the external system controls.
15. Overall control descriptions for all control sequences included in the system.
16. A detailed testing plan, setting forth step-by-step descriptions of the procedures proposed for the systematic calibration and testing of all controls and instrumentation equipment furnished by the Supply Contractor and installed by the Installation Contractor.
17. Microprocessor based controller and human interface information and cut-sheets.
18. Detailed plans for commissioning the units and a startup plan.
19. A plan for providing 24-hour response during the commissioning period with a daytime staffing plan and names, qualifications, and telephone numbers of those assigned off-hour standby duty.
20. Performance data showing the noise performance of all waste heat radiators. Provide sound pressure levels for each radiator at each octave band center frequency at 25 feet.
21. Calculations supporting sizing of equipment including pipes sizing, exhaust backpressure, the grounding resistors, batteries system capacities. Include recommended settings for all protective devices and relays specified in this and other sections.
22. For use by the Installatin Contractor, manufacturer's recommended installation procedures for all major pieces of equipment including: engine generators, heat recovery equipment, panels and other control system components, waste heat radiators, starting air system and switchgear.
23. Submittal information requested in other sections of this Request for Proposals.

D. PRODUCT DATA SUBMITTAL: In addition to the Preliminary and Final submittals and those specified in Section 11000, provide the following information in one complete submittal in accordance with Section 01300:
   1. Complete operations and maintenance manuals per Section 01730 and 01750

2. Master test logbook covering all tests, i.e. piping, power, emissions, electrical, instrumentation, and other equipment. Arrange by process and subsystem and include all checklists, test forms, and test results. Furnish a duplicate copy to the Project Representative and update weekly
3. The following types of documents will be required for the cogeneration system controls that use any type of programmable or programmed device for process control. The devices would include PLC's, electronic governors, process controllers, engine auxiliary controls including ignition and/or air/fuel ratio controls, etc.
   a. System description in narrative format.
   b. System block-diagram drawing that identifies location and node names of the connected PLC's, PCs, operator interfaces, servers, modems, etc.
   c. Software used for system configuration, which is updated and ready to load. Include all licensing.
   d. Drawings showing I/O wiring connections and address assignments.
   e. Address assignments identifying all of the variables within the control system, such as register and address assignments, variables, and I/O tables (if required).
   f. Control system programs for each PLC or programmable process control device in a state that is updated and ready to load, as well as a printout of the program.
   g. Narrative description of each part of the program and the software used to enter the description.
   h. Documentation either from the PLC manufacturer or third-party software vendors should provide functions important to maintaining the control system such as uploading, verifying, and storing the application programs.

1.04 UNIT RESPONSIBILITY

A. The Supply Contractor is to select and furnish the equipment specified under this section and maintain responsibility for this work.

B. The Supply Contractor is to select and furnish all of the components specified in this section and all other sections where included by reference. In addition, the Supply Contractor shall be responsible for design of the following:
   1. Design of the engine cooling and heat recovery equipment furnished by the Supply Contractor. Design of the piping interconnections between the engine and the engine cooling and heat recovery equipment to the extent that the design includes selection of pipe size and final system configuration. Include calculations of the exhaust system engine backpressure, considering the entire exhaust system, including a dirty heat exchanger, dirty silencer, and all exhaust piping to its end above the roof of the building. The design services to be furnished by the Supply Contractor do not include design of piping supports or anchors external to the engine skid or sub-frame.
   2. Structural attachments and supports for all equipment furnished by the Supply Contractor.
   3. Design of electrical and controls systems associated specifically with the equipment furnished by the Supply Contractor.
   4. Coordination of production, factory testing, and delivery of all components furnished by the Supply Contractor.
   5. Observation of installation of the equipment furnished by the Supply Contractor.
   6. Final alignment, testing, initial start-up and commissioning of the equipment furnished by the Supply Contractor.
   7. Factory and field-testing of each engine-generator unit.
   8. Training as required by this specification.
   9. Production and delivery of operation and maintenance information as required by this specification.

C. The Supply Contractor may either be the manufacturer of the engine or a factory authorized distributor of the engine manufacturer's products. If the Supply Contractor is to be a factory-authorized distributor of the engine manufacturer's products, submit a certification from the engine manufacturer, signed by an officer of the corporation under penalty of perjury attesting that the Supply Contractor qualifies under the terms described here and is fully capable of discharging the responsibilities set forth here. Further attest in the certification that the Supply Contractor has full authority to provide engineered systems for use with the manufacturer's products and to apply the manufacturer's products to specific applications without impairing or diminishing in any way the manufacturer's guarantee as set forth in this specification. The engine manufacturer shall also warrant that the Supply Contractor possesses the capability within its own organization or through a

retained consultant (who shall be named in the certification) to properly design the mechanical, hydraulic, electric, and electronic systems to be supplied in accordance with this specification.

D. Provide the following documentation in addition to documentation required elsewhere in this specification. An officer of the indicated manufacturer, attesting to the accuracy and completeness of the information thereon or the suitability of the subject equipment as appropriate shall certify each certificate under penalty of perjury.
   1. Certification, by the engine manufacturer's engineering organization, indicating that an independent review of the Supply Contractor's design and selection of engine cooling and heat recovery equipment, including piping size selection, has been conducted and the engine manufacturer has no reservations or objections.
   2. Certification, by the engine manufacturer's engineering organization, indicating that an independent review of the Supply Contractor's design of the control and electrical systems, including any subcontracted design, has been conducted and the engine manufacturer has no reservations or objections.
   3. Certification, by the engine cooling and heat recovery equipment manufacturer that the equipment to be provided for the specific application is compatible with the engine when operating under the specified service conditions.
   4. Certification, by the engine manufacturer, that the design of the vibration isolation system has been reviewed and found to be suitable for the specific application.
   5. Certification, by the engine manufacturer, that selection of all other components and design recommendations furnished under the terms of this specification not directly furnished by the engine manufacturer have been independently reviewed and the engine manufacturer has no objection to their use or to the recommendations.

E. The engine-generator manufacturer's engineering organization is to provide certification that the electrical protection furnished under these other contracts is suitable for these engine-generators. The electrical protection scheme shall be available for review as a design document during the preliminary submittal stage.

F. The engine-generator manufacturer is to provide review of the protection scheme in the design period services stage and certification of the final protection scheme as part of their requirements in the manufacturing stage. The design period services review is to be done by a registered professional electrical engineer employed by the engine-generator manufacturer and is to be signed and sealed. The certification of the final protection scheme drawings is to be per the requirements in the preceding paragraph.

1.05 SHIPMENT TO SITE AND STORAGE

A. Equipment is to be shipped and stored as specified in Section 01600 and as noted in the following paragraphs.

B. Pre-assemble engine-generator packages prior to shipment.

C. Pre-assemble sections to the largest degree practical for shipment.

D. Store as per manufacturer's storage instructions and Section 01600.

1.06 WARRANTY AND GUARANTEE

A. WARRANTY AND GUARANTEE: The Supply Contractor warrants and guarantees the goods and services furnished under this Contract will be free from defects in material and workmanship, and will conform with all requirements of this Contract, for a period of one (1) year from date of **Final Acceptance** of such goods and/or Services by the County. The Contractor is responsible for all costs of replacement, including shipping charges, for goods or Services found defective within that period, regardless of who actually corrects the defect.
   1. The Supply Contractor warrants that the equipment will perform as specified and as indicated by the Proposer on the response forms in Section 6 during the warranty period without need for top end overhauls, turbocharger overhaul, or other major periodic maintenance. If such maintenance is

required during the warranty period, the Supply Contractor shall perform such maintenance and provide all materials at no cost to the County.

2. The Supply Contractor warrants that spark plug and ignition system parts life shall be at least 2000 hours. If spark plug and ignition system parts life during the warranty period proves to be less, the Supply Contractor shall furnish at no charge to the County the additional spark plugs and ignition system parts that would be required during 5 years of operation.
3. County personnel will be responsible for routine maintenance and major overhauls as required with the Contractor's certified training. If the County's work on the engine has followed the Contractors required maintenance and overhaul procedures, the engine warranty shall remain in effect.
4. See Section 01014 for preliminary schedule.

B. EFFICIENCY GUARANTEE:
1. Provide a guarantee of minimum efficiencies at 100, 75, and 50 percent of rated load on natural gas. Efficiency is to be stated as Brake Specific Fuel Consumption (BSFC in Btu/bhp-Hour calculated according to the ASME Performance Test Codes (PTC 17).
2. The guarantee values are to be those stated by the Proposer in the Capacities and Performance table in Section 6 subsection 6-5 E.

C. EMISSIONS GUARANTEE:
1. The Supply Contractor shall provide a guarantee of maximum emissions. Emissions values shall be stated in grams per brake horsepower-hour for oxides of nitrogen (NOx, g/bhp-hr), carbon monoxide (CO, g/bhp-hr), and non-methane hydrocarbons (NMHC, g/bhp-hr) for three loading levels (100, 75, and 50 percent of rated load) and for both natural gas and sewage digester gas. If a tri-fuel engine is proposed, provide data for 100 percent diesel operation as well. All measurements are also to be reported in Ppmvd converted to flue gas conditions of 15 percent oxygen. The guarantee values are to be those stated by the Proposer in the Capacities and Performance table in Section 6 subsection 6-5 E.
2. All emissions testing shall satisfy the applicable requirements of Puget Sound Clean Air Agency (PSCAA) at the time of testing. PSCAA currently utilizes EPA test Methods as delineated in 40CFR60 Appendix A. In the event PSCAA specifies other or additional test methods, or alters the test methods, the engines shall be tested according to the applicable versions. Specific methods for criteria pollutants presently include the following:
   a. NOx: EPA Method 7E
   b. CO: EPA Method 10
   c. VOC: EPA Method 18, 25 or 25A as required by PSCAA
   d. Exhaust Flow: EPA Methods 1-4 or Method 19 if accepted by PSCAA
3. All emissions and performance guarantees shall be for operation on 100 percent natural gas and 100 percent digester gas over the load range of 50-100 percent. The engines shall also be able to maintain the emissions guarantees for any blend of digester gas and natural gas. If the proposer does not believe the engine can provide such performance on blended fuel, they should so note it in their Proposal.
4. The County anticipates all factory testing will be performed on pipeline quality natural gas only at 50, 75 and 100 percent load. If the facilities exist to perform factory testing on simulated lower Btu gas (air-blended natural gas or other), the proposer should so note in their Proposal, as this will be favorably reviewed.
5. All field-testing shall at a minimum be performed on normal process digester gas at 50, 75, and 100 percent load. If available, field-testing may also be performed on natural gas at 50, 75, and 100 percent load.
6. The engine controls should not result in over-control of emissions, in particular NOx, at the detriment of combustion stability, BSFC, or CO. Rather, the controls should be configured to comply with the emissions limits, in particular NOx, with suitable margin (~10-20 percent) and otherwise optimize combustion stability, BSFC and CO.
7. Emissions results for both factory and field tests shall not exceed the guaranteed values stated in Section 6 subsection 6-5-E. The engine Supply Contractor shall guarantee that maximum exhaust emissions shall not exceed the following specific emissions levels at full load. Guarantees of lower values will be favorably reviewed.

NOx	1.25 g/bhp-hr
CO	3.0 g/bhp-hr
NMHC	1.0 g/bhp-hr

8. An independent emissions testing contractor, whose name and qualifications shall be submitted to the Project Representative for review and approval shall perform the emissions testing under the supervision of the Supply Contractor. Factory emissions testing shall meet the requirements of this paragraph 1.06 and shall be witnessed by a representative of King County. Field emissions testing will take place in two-phases including (1) emissions optimization testing and (2) compliance testing which will be witnessed by a representative of the Puget Sound Clean Air Agency (PSCAA). Optimization testing will be carried out on-site to allow the Supply Contractor to make final adjustments to the engine controls to ensure best engine emissions performance prior to witnessed compliance testing.
9. Additional Testing: After initial startup period and prior to acceptance of the engine-generators, and at two other occasions during the first 6 months of engine-generator operation the Supply Contractor shall perform additional emissions tests as directed by the Project Representative. No announcement will be made prior to testing and no adjustments will be allowed prior to testing. The two additional emissions tests shall test for all three pollutants at 100, 75, and 50 percent of rated. Testing may be done on all engines on both natural gas and sewage digester gas.

1.07 ENVIRONMENTAL CONDITIONS

A. Environmental conditions are stated in the following table with additional information in the following paragraph.

Design maximum outdoor temperature	85 F
Design minimum outdoor temperature	23 F
Site elevation geodetic above mean sea level	15 ft

B. Relative humidity is expected to range between 20 and 98 percent. Filtered air from the engine room will be used for combustion air. Temperatures are expected to range between 45 degrees F and 109 degrees F in the engine room.

C. Design all equipment to withstand seismic forces associated with seismic zone 3. All equipment, piping, and appurtenances mounted on or with the engine-generator are to be attached and braced to withstand seismic zone 3 forces. Comply with Section 01031. Provide design requirements for mounting the engine-generator and other components to the building foundation. The design requirements are to contain details of restraints to hold the equipment in place and prevent overturning in an earthquake. The details will be subsequently incorporated in the foundation design of the building.

PART 2 PRODUCTS

2.01 FUNCTIONAL REQUIREMENTS

A. The following section defines the functional requirements of the cogeneration system equipment to be provided by the Supply Contractor.

B. ENGINE-GENERATOR:
1. The Supply Contractor shall provide two medium speed, industrial duty, lean combustion, turbocharged, spark-ignition, or compression ignition, internal combustion engines suitable for operation with sewage digester gas, natural gas or any blend of the two fuels. As an alternative to a spark-ignited engine, the Supply Contractor may propose an engine capable of operating on digester gas and natural gas using Ultra-Low Sulfur Diesel (ULSD) fuel for pilot oil. As an alternative method of providing standby plant power, varying fractions of ULSD and digester gas may be used to maintain constant engine output with different quantities of digester gas.
2. Maximum engine speed shall be 900 rpm.
3. The engine-generator provided shall be capable of supplying at least 2,300 kW on a continuous basis while operating on any combination of digester gas and natural gas fuel.
4. Furnish generators suitable for continuous cogeneration operation as well as standby power duty application.

5. Provide a fully functional cogeneration system package including engine-generators, medium voltage switchgear, auxiliary support systems as defined, and system controls. Provide controls including an electronic governing system, voltage/power factor controller, permanent magnet generator excitation equipment, load sharing, load control, equipment protective features, and all devices necessary for a complete generation and heat recovery system.
6. Conform to the requirements of Section 11000.
7. Fuels available are sewage digester gas, natural gas, and ULSD. Sewage digester gas has an average lower heating value of 550 Btu/cu. ft. and with hydrogen sulfide levels normally less than 100 ppm. Natural gas has a lower heating value of 910 Btu/cu. ft. and less than 10 ppm of hydrogen sulfide. ULSD has a lower heating value of 140,000 Btu/gallon and less than 30 ppm of sulfur. See table below for estimated properties of the digester gas:
8. The engine-generator system is to operate smoothly at loads between 0 and 100 percent of full load. Each engine-generator system shall operate continuously and efficiently at all loads between 50 and 100 percent of full load.

C. PROPERTIES OF DIGESTER GAS:

Parameter	Minimum	Maximum
Lower Heating Value, Btu/scf	500	600
Moisture Content, percent saturation		80
Hydrogen Sulfide Concentration, ppm	50	250
Siloxane Concentration, mg/m3	5	12
Particulate Removal, percent	99.5	-
Particulate Size, microns	-	3
Digester Gas Pressure, psig	as required	as required

Digester gas will be boosted to the pressure required by the Supply Contractor for the engines proposed.

D. GENERATORS OPERATIONAL REQUIREMENTS:
1. General: The Supply Contractor shall furnish a complete generator controls system including equipment for synchronizing the generators to the local bus and the utility, load sharing and speed controls, medium voltage switchgear and protective relaying. The controls equipment supplied shall enable the operating modes and capabilities described in the following paragraphs.
2. Existing Plant Electrical: Seattle City Light (SCL) provides Power to the West Point facility via two separate 26.5 kV feeders. The Canal service is the primary feeder and the Broad service is the alternate supply. These lines serve the plant via a SCL transfer switch at 26.5 kV which then connects to the A and B side substations, XFMR TA and XFMR TB. Therefore, the plant is always only fed from either the Canal or Broad service but not both simultaneously. The plant electrical distribution is separated into an A and B bus 13.8 kV distribution system. However, the plant operates with both 13.8 kV mains, 722 MSG01-02 and 722 MSG01-16, and the 13.8 kV tie breaker 722 MSG01-9 normally closed since the plant cannot functionally operate with only the A or B side energized.
   a. If power from SCL is lost on the Canal (primary) service, the transfer switch will transfer to the Broad (secondary) service within 5.5 seconds, unless the Canal service is restored in that time. The plant main breakers 722-MSG01-02 and 722-MSG01-16 will remain closed for that period to allow this transfer to occur. They will trip on under voltage (existing control) if power is down longer than 11 seconds.
   b. The cogeneration system will be connected to the A side of the plant distribution system.
3. Utility Parallel Mode: Each engine-generator and both engine-generators together shall be capable of operation in parallel with the Utility in a load control mode. In this mode, controls shall be provided that allow selection of a desired load level, which the load sharing and speed controls system shall maintain. Provisions shall be made for the independent setting of load on each generator. This function shall be referred to as “base load mode.” In addition, while operating in parallel, provisions shall be provided to enable “process variable control.” This will enable the engine-generators’ base load setpoint to be a process variable such as digester gas supply pressure, enabling changing of the engine-generator load as a function of available digester gas. The engine-generators’ shall also be capable of operating in an “import/export mode.” In this

mode, the engine-generator controls shall adjust the engine-generator base load setpoint in order to maintain a fixed amount of imported or exported power to the Utility.

4. Island (Standby) Mode:
   a. If power from SCL is lost on both the Canal and Broad substation services to the plant. Then the generators shall have the capability to operate the plant in an islanded mode where the generators provide standby power capability to critical plant loads.
   b. The two-engine-generators shall be capable of operating in an isochronous load-sharing mode wherein both engine-generators maintain a constant frequency (RPM) and share the total plant load equally while operating islanded from the Utility. The change in status from utility parallel mode to island mode is to be determined through logical monitoring of the status of the circuit breakers that interconnect the cogeneration bus to the plant main breakers. This logical development is to be included in the system master controls. If power from both SCL feeders is lost (plant islanded), the power generation system will be manually connected (by plant operations staff) back to the plant distribution via the plant main switchgear. Circuit breakers 717-MSG01-1 and existing circuit breaker 722-MSG01-1 would be manually re-closed to energize the plant main switchgear from the generators.
   c. In the standby mode, plant electricians will strip loads from plant electrical systems and energize systems in a priority order.
   d. In Island mode, each generator shall be able to carry the largest block motor loading in the plant without allowing voltage to dip below 80% of nominal. The largest motor load will be the existing effluent pumps which are 2200 HP, variable frequency drive powered.
   e. Include status indication that the generators are operating in island mode. Indication at the local engine panel, engine generator panel, and system master panel. Also provide status output to SCS.
5. Mode Switching:
   a. Generator output breaker and Utility breaker statuses shall be used by the load sharing and speed controls to automatically switch from the Utility Parallel mode to the Island mode on a loss of power from the Utility.
   b. The controls shall also automatically switch back to load control mode upon restoration of Utility power and the parallel interconnection back to the Utility. The response of the controls and generating equipment shall be adequate to ensure a frequency deviation of less than .5 hertz occurs during a transition from the Utility parallel mode to the Island mode.
   c. The power generation system is to be designed to continue to operate on loss of Seattle City Light (SCL) power. If power is lost from SCL, the existing main switchgear cogeneration feeder breaker 722-MSG01-01 will open via its existing UV relay (in one tenth of one second) leaving power generation with only its auxiliary loads. Among these will be gas compressors and cooling water circulating pumps. The power generation system shall be designed to “ride through” and remain on line during this transition from as much as full load to only auxiliary loads. If the system does not ride through, the black start mode will be required. The system master controller shall annunciate failure to ride through. Any additional relaying or equipment specific protection required to facilitate this ride through are to be included in this system package.
   d. These system master controls shall include monitor and alarm provision for the existing cogen feeder breaker, 722-MSG01-1, fast undervoltage trip which will be provided as an input status to the system master controller.
   e. Include provisions for system master panel monitoring and indicating of restoration of SCL voltage at either of the plant mains. This will be made available via SCS and will provide an indication that restoration from the Island mode back to Utility Parallel mode can be considered.
6. Black Start: Black start is defined as the starting mode for the generators in the event that they fail to ride through a loss of power from the Utility or if they need to be started when neither generator is running and the critical auxiliaries MCC (717-EMCC01) is un-powered and Utility power is down.
   a. The plant 401 generator, fueled by propane, will be available for a short time to support a black start. The 401 Generator will be able to handle cogeneration auxiliary systems loads of approximately 200 kW for periods of thirty (30) minutes. The auxiliary systems will include gas compression equipment supplied by others
   b. The only other power supply available for a black start will be the Supply Contractor furnished engines and control systems batteries and the 120 VAC uninterruptible power supply for the

system master controller HMI and the switchgear dc control power. For black start control, it shall be assumed that the plant standby power (401 generator) will be supplying back up power within 5 minutes of the loss of plant power. The back up power for the engine-generators system shall include battery system back up for controls and any other equipment that may need to be powered during this period for a minimum of sixty minutes. Status monitoring shall also be included to monitor the status of the plant 401 generator.

c. Black starts are to be functional without the necessity of any additional auxiliary support generators other than the 401 generator
d. The indication of a black start condition will be similar to the conditions for the standby mode except in black start, it is assumed that the cogeneration units did not ride through and cogen auxiliary support systems have shut down
e. The sequence controls are to first isolate the cogeneration switchgear from the rest of the plant by verifying that circuit breaker 717-MSG01-01 is open. If not, a status notification shall be issued by the master controller indicating that this circuit breaker should be opened.
f. Black start control is to be manual. Engine cooling shall be by waste heat radiators although it shall be possible for the plant operators to energize the plant heat loop and operate the system to recover heat and send it to the digesters if they so choose
g. The plant 401 generator will be started and made available to power gas compressors and critical coolant pumps and essential lighting. As soon as gas pressure is sensed, the black start sequence shall be enabled.
h. Include a provision to monitor the status of full voltage available on the motor control center bus which serves the cogen critical auxiliary loads. This status will be available to the master controller via SCS
i. A plant operator can then start one engine-generator. Once this generator is on line, power shall be fed to the 480-volt essential bus 717-EMCC01 load via an automatic transfer switch provided under the installation contract by others.
j. Coolant circulating pumps and fans associated with the waste heat radiators shall be enabled and shall start as required.
k. The second engine-generator, if available, will be allowed to be started by plant staff and synchronize with the lead unit.
l. As soon as the generators are on line along with the necessary dedicated and system auxiliary support loads, the generators are to be connected to the plant distribution by manual closure of the cogeneration switchgear bus main circuit breaker, 717-MSG01-01.

E. SYSTEM GENERAL CONTROLS REQUIREMENTS:

1. General:
   a. Provide system monitoring, alarm, and controls features as specified in the following paragraphs unless specifically noted otherwise in these specifications.
   b. Provide a complete engine controls system including devices for start/stop and monitoring of the engine-generators, alarm and shutdown devices, an HMI for monitoring and control of engine parameters, annunciation, controls for start/stop of auxiliary equipment, etc, as required to provide a complete engine-generator controls system.
   c. The controls should have capabilities for remote start /stop, synchronization and loading of each engine-generator via the Master Control System.
   d. Table I at the end of this section is a listing of analog signal values that need to be monitored and indicated, alarms and statuses that are to be displayed or annunciated, and control features to be included in this system. These features and functions shall be the minimum system requirements.
   e. To the maximum extent possible, provide manual and automatic controls for all functions in the system controls to facilitate trouble shooting and diagnostics.
   f. In general, internal controls interconnections between equipment provided in this system may be hard wired or via digital communications. However, each generator shall be operable independently from the system master controls in the manual mode of operation should the master controls not be available.
2. Interface to Plant Existing Control System:
   a. The existing plant supervisory controls system (SCS) includes the existing plant programmable logic controllers and operator interface workstations.
   b. The generation controls system specified under this section shall include controls and communications interface to the SCS.

c. Include provisions for both digital communications interface and hard-wired interface to SCS.
d. Inputs that are critical to the overall system controls such as circuit breaker statuses, load or reactive power setpoint controls, or voltage-monitoring inputs shall be hard-wired inputs to the master controls.
e. Hard-wired connections as required to monitor statuses of plant circuit breakers, control switches, and other devices per the specifications in this section to be as follows:
    1) Discrete inputs shall be made available to the system master controls via voltage free contacts.
    2) Analog inputs except for voltage signals will be made available to the system master controls via 4-20ma dc current signals.
    3) Voltage signal inputs will be made available to the system master controls via 120 VAC inputs.
f. For digital communications with SCS, the method of communication and protocol proposed should be, to the maximum extent possible, open architecture, commercially available and non-proprietary.
g. The method of communication with SCS shall be through Ethernet over the plant's local area network. The Supply Contractor shall map inputs and outputs with respect to SCS for communication over the Ethernet network and shall coordinate addressing and mapping requirements for input and output data registers with the Project Representative during construction. As a minimum, refer to Table I at the end of this specification section for a list of data which shall be networked to the SCS.
h. The Supply Contractor shall provide all required hardware such as a PLC Ethernet communication module for the master controller to transfer data with plant's existing SCS. Physical Ethernet cabling for this interconnection will be provided by others under the installation contract.

3. Manual-Auto Control:
    a. Automatic control is defined as control via the system master controls.
    b. Manual control is defined as control locally by operator intervention.
    c. Manual controls shall be impendent of the functionality of the master controls.
    d. Provide selector switches for manual/auto control where manual-auto control is used.
    e. Selector switches to be heavy duty oil tight per section 16825.
    f. Provide status indication of the switch position at the engine generator panel level and the system master controls level. In addition provide indication at all other locations where external auto control interface is used. See Table I for minimum requirements.
    g. Control transitioning between manual and auto control shall be bumpless.
4. Local-Remote Control:
    a. Remote control is defined as control via the existing plant SCS system.
    b. Local control is defined as control via the controls specified in this section.
    c. Provide control functionality to allow user selection of local or remote control. Selector may be either hardware or HMI function.
    d. Provide status indication of the switch position at the system master controls level and include provisions for indication at SCS. See Table I for minimum requirements.
    e. Control transitioning between local and remote control shall be bumpless.
5. Set-point Control:
    a. Local and remote setpoint control shall be provided for system real power and reactive power control as specified in this section.
    b. Include local/remote control selection as specified above.
    c. For local setpoint control, provide up and down toggles for user raise/lower adjustment.
    d. Provide local and remote indication of the active setpoint value.
    e. In the remote control mode, the SCS will control the setpoint based on SCS monitored plant conditions.
6. Control Interface to Auxiliary Support Equipment:
    a. Configure control of auxiliary equipment controls such that auxiliary equipment dedicated to a specific engine is not subject to common mode failure at the system controls level.
    b. Provide Hand-Off-Automatic selector switches for auxiliary support equipment to allow local manual operation for testing purposes.
    c. Provide selector switches for local mounting at driven equipment by the Installation contractor.

d. Provide status of the position of the HOA switches at the local engine panel, engine generator panel and system master control panel.
e. Motor starters for auxiliary equipment larger than 1/3 horsepower will be provided by the Installation contractor in motor control centers.
f. Monitor equipment run and ready status via hardwired status contacts from the motor controls centers.

7. Loss of Control Signal:
   a. The system control response to loss of monitored signal shall be based on potential hazards to personnel or damage to the equipment.
   b. If the loss of signal presents a potential hazard to equipment or personnel, the controls shall cause an alarm and shutdown of the affected generator or generators.
   c. If the loss of signal does not present a hazard to equipment or personnel, then the equipment may remain in operational and a warning alarm shall be provided.
   d. If the hazard is to equipment only and does not present an immediate risk or is backed up by secondary protection, then a warning alarm followed by a timed out shutdown can be provided.
8. Alarms and Status Monitoring:
   a. Include provisions to monitor alarms at the local engine panel, the engine generator panel and at the system control panel.
   b. Shutdown alarms shall be annunciated at the above panel locations and be made available for communication to SCS.
   c. Provide warning level alarms for non-critical annunciation.
   d. Provide status monitoring to the extent that automated controls can be implemented with the verification that all equipment required in the sequence of operation is in the proper control mode or ready state prior to initiation of the automated sequencing.
   e. Include alarm acknowledge functionality at all alarm displays.
   f. Provide a common system shutdown level alarm for display at the system master panel and for output to SCS.
9. Controls Panels:
   a. Local engine panels shall be provided local to each generator for local monitoring and control of each generator.
   b. Local engine panels shall include monitoring, control and diagnostic capabilities to allow use primarily for trouble shooting and maintenance or back up control where other system controls are not available.
   c. Normal user interface control is intended to occur at the engine generator panels and system master control panel located in the electrical room separate from the engines location.
   d. Engine generator control panels and the system master control panel shall include system level control functions for automated control interface to the generators.

F. LOAD SHARING AND SPEED CONTROLS: The generator controls shall provide the capability for the control of real power and speed as follows:
   1. Provide controls at each generator panel for the adjustment of the engine speed/load independently for each generator.
   2. For Utility Parallel mode control, provide manual-auto control selection for setpoint control to be set locally at each generator panel or for the setpoint to be established via the system master controls.
   3. For Utility Parallel mode control, provide local/remote setpoint control such that the setpoint can be established at the system master controls level or provided from SCS. This mode of control will be used to maintain a desired generators overall power output level when the generators are paralleled to the Utility. In general, the output power level will follow a digester gas production proportional signal from SCS.
   4. The status of auxiliary circuit breaker contacts, directly connected to the load sharing and speed controller, shall be used by these controls to switch from real power output control mode to real power load share mode when switching from the Utility Parallel mode to the Island mode. When in Island mode, the engine-generators shall operate in load sharing mode.

G. VAR / POWER FACTOR: The generator controls shall provide the capability for the control of reactive power as follows:
   1. Provide controls at each generator panel for the adjustment of the VAR/PF setpoint and to select between VAR or PF control modes independently for each generator.

2. For Utility Parallel mode control, provide manual-auto control selection for setpoint control to be set locally at each generator panel or for the setpoint to be established via the system master controls.
3. For Utility Parallel mode control, provide local/remote setpoint control such that the setpoint can be established at the system master controls level or provided from SCS. This mode of control will be used to maintain a desired plant overall power factor when the generators are paralleled to the Utility.
4. The status of auxiliary circuit breaker contacts, directly connected to the VAR/PF controller, shall be used by these controls to switch from VAR/PF control mode to reactive current sharing mode when switching from the Utility Parallel mode to the Island mode. When in Island mode, the engine-generators shall share the reactive current equally and proportionally to the power level of each generator.

H. SYNCHRONIZING: The Supply Contractor shall provide equipment that will interface with the load sharing and speed controls for the purposes of synchronizing each engine-generator to the bus. The capability for both automatic and manual synchronization of the engine-generators shall be provided. The synchronizing equipment shall perform voltage and frequency matching functions and when in the automatic mode shall issue a closure command signal to the appropriate breaker. The synchronizing equipment shall be capable of synchronizing either engine-generator to the bus, whether the bus is energized by Seattle City Light or another generator, as well as to a dead bus.
1. Synchronizing equipment shall be provided at each engine-generator's generator control panel.
2. The synchronizing equipment shall have provisions for the synchronizing of up to three engine-generators. In addition, the synchronizer shall have provisions for synchronizing and closing (as indicated) the following 13.8 kV circuit breakers:
   a. 717-MSG01-01 – New Cogeneration switchgear main breaker.
   b. 722-MSG01-02 – Existing plant main breaker.
   c. 722-MSG01-16 – Existing plant main beaker.
3. Synchronizing equipment shall have the following operating modes, selectable by Plant Operations or the system master controls as noted:
   a. OFF: In this mode the synchronizer shall be de-energized and electrically isolated from all connections. In this mode, only full manual synchronization shall be possible.
   b. PERMISSIVE: In the permissive mode, the synchroscope and indicating lamps shall be powered to provide status of the relative voltage and phase angle matching of the oncoming generator with the bus. No adjustments to match phase angle or voltage shall be generated by the device. Only manual synchronization shall be possible in this mode.
   c. SYNCH CHECK: In this mode the synchronizer shall monitor and adjust the voltage and frequency of the on-coming generator but shall not issue a breaker closure command. In the synch check mode, synchroscope, and indicating lamps shall be powered to provide status of the relative voltage and phase angle matching of the oncoming generator with the bus. In addition, when voltage and phase angle are matched, a voltage free contact shall close which shall be utilized to power a "ready to synch" indicating lamp. While in the synch check mode, the synchronizer shall prevent manual breaker closure by the Operator unless voltage and frequency are within specified limits.
   d. RUN: In the Run (automatic) mode, the synchronizer shall perform all of the functions of the synch check mode but shall issue a breaker closure command when voltage and frequency are matched. Automatic closure control is to be limited to synchronizing circuit breakers only. Automatic initiation of the RUN mode shall be included in the generators start sequence controls for the generator circuit breakers to allow automatic synchronizing in the start sequencing. The generators switchgear main circuit breaker and the existing plant main circuit breakers will require operator initiation of their auto sync controls.
4. Following automatic breaker closure, the synchronizing controls shall require re-initialization by momentarily switching to the OFF mode and then back to RUN. This is to prevent an unwanted automatic resynchronization attempt following manual or automatic circuit breaker opening. The synchronizing controls shall have status indicators, driven by circuit breaker auxiliary contacts to indicate that the breaker has closed:
   a. Provide manual synchronizing control for every circuit breaker that requires synchronizing.
   b. Manual control is to be a backup to the automatic controls. As such, the manual controls are to be independent of the system master controller to the extent that full synchronizing controls can be accomplished without the system master controller in operation.

I. FUELING REQUIREMENTS:

1. The engine-generators must have the capability of operating on primary fuels of either digester gas, natural gas or a variable mixture of these two fuels. If a compression-ignition, tri-fuel engine type is proposed, the engine must be capable of operating on digester gas and natural gas utilizing ultra low sulfur diesel fuel (ULSD) as the pilot fuel. Operation of a tri-fuel engine on digester gas only, with a varying quantity of ULSD can be offered as an acceptable approach for island operation.
2. In the utility parallel mode the system shall normally operate on digester gas or on a mixture of digester gas and natural gas (or ULSD). Operation on natural gas only shall also be possible if natural gas is available. A 4-20 mA signal, proportional to gas availability in the low-pressure, digester gas system (LSG) will be used to develop a signal to control the loading of the engine-generators. The system master controls shall be configured to accommodate operation on strictly digester gas (and ULSD pilot fuel) or a combined digester and natural gas operation (and ULSD). A control selector function for these two fuel configurations shall be included at the system master controls location. Indication of the fuel configuration selection shall be displayed at the system control level, at the engine-generator panel and at the local engine panel and shall be made available as a status output signal to the plant SCS. The fuel configuration selection of control shall be set up such that it can be changed by other control commands in the system control such as the default to combined fuel in the standby mode or by selection via the SCS.
3. The engine-generator shall be capable of starting on either digester gas only or natural gas only if the engine is spark ignited. If the engine is compression ignited, the engine shall start on diesel fuel and switch to digester gas, natural gas, or a mixture of both as primary fuel as soon as the starting sequence is completed.
4. For digester gas operation in the utility parallel mode, the development of the engine-generators loading control signal based on available fuel will be furnished by others outside of this request for proposal package. The controls to be developed within the master controller in this system shall include control development as required to set a balanced loading of the paralleled engine-generators in operation that is proportional to the rate of fuel production signal input, for the digester gas only fuel configuration and to operate the engine-generators at a set power output production when in the combined fuel configuration. In the combined fuel configuration, the system master controls shall operate the fuel blending such that the digester fuel is consumed at a rate proportional to its availability per the fuel availability input signal and then supplemented via fuel blending to meet the setpoint power output rate. The following functionality shall be provided:
   a. LSG PRESSURE SIGNAL: The plant external system controls will provide a continuous signal proportional to the LSG production. The total range of the LSG availability signal will be 4-20 ma with 4 mA indicating minimum gas production rate and 20 mA indicating maximum production rate. When the generator or generators are operating in the cogeneration (utility parallel) mode with automatic loading control and with digester gas only, the engine-generators shall follow the external loading setpoint as described here. The loading shall follow the setpoint independent of the number of generators running since the setpoint will be adjusted in the external controls to accommodate the number of operating units on line.
   b. DIGESTER GAS SUPPLY INCREASES: When the system is running on digester gas only in the cogeneration (utility parallel) mode, there will be a need for notification of need to add or drop an engine-generator as gas availability fluctuates. If gas availability is rising and the engine in operation is using available fuel at full load, or if the engine is approaching full load and there is an expectation that the next unit would be needed, then the master system controls shall annunciate the need for the start of an additional engine. The logical determination of the need to add an engine-generator is to be developed within this generator's system package. If the gas production is high, there is more gas than the currently operating engine-generators can consume and LSG pressure will rise. When the controls cannot increase the engine-generator load further to consume the additional fuel, or if the fuel availability signal has been rising along with engine-generator loading and the engine-generator is approaching full load, there may be a need to add an additional engine-generator. The system logic here shall include time delay functionality to avoid unnecessary messages suggesting engine-generator starts. The time delay shall include a logical auto reset in the event that the system conditions fall back below the engine-generator start logical parameter setting. Provide an adjustable time delay of 0.5 hours to 24 hours. Also provide displays related to sending a message suggesting adding an engine-generator. Provide displays at the master controller human machine interface (HMI) and provide

a status output for the SCS and output status to SCS to report high LSG pressure and to relay the suggested engine-generator start message that an additional engine-generator is required.

c. DIGESTER GAS SUPPLY DECREASES: If gas availability decreases to the point where one engine-generator could be dropped, then the system master controls shall annunciate the need to drop an engine-generator. The logical determination of this condition is to be included in the system master controls. The logical development of this control shall be similar to that for the add an engine-generator logic described above except that it shall operate in the reverse. The time delay and reset features similar to that described for the add an engine-generator logic shall be included. Also provide displays in the system master controller HMI and provide a status output for the SCS related to sending a message suggesting calling for reduction of one engine-generator. Provide displays at the system master control panel and output status to SCS to report all operating conditions.

d. LOW LOAD OPERATION: If at any time during the operation of the engine-generators in the utility parallel mode, the controls require the on-line engine-generators to be loaded below their minimum recommended operating load, an engine-generator must be shut down or the system will need to be switched to the combined fuel mode (if the combined fuel mode is available to be used). If the engine-generators continue to operate below minimum power for 0 to 4 hours (variable), provide the control function to automatically take the lead engine-generator or only operating engine-generator through a sequenced shutdown. Provide displays indicating that an engine-generator is shut down due to low gas availability. When an engine-generator is shut down due to low LSG digester gas fuel availability, or low gas pressure, provide displays at the system master controller HMI and output status to the SCS to report the change. Also, if the system switches to the combined fuel configuration, this shall be indicated similarly. The load setpoint in this event shall be the load that was being carried at the point that the switch occurred.

e. LOSS OF LSG PRESSURE FUEL AVAILABILITY SIGNAL: Upon loss of LSG pressure or the fuel availability signal from the plant external controls system (with other SCS communication still intact), provide an automatic sequenced transition from digester gas to the combined digester gas and natural gas fuel configuration for the number of engine-generators currently running if this fuel configuration is available. If the combined fuel configuration is not enabled, then maintain the digester gas only fuel configuration. Maintain the engine-generators loading at the level at which they were operating prior to loss of signal. Provide a display at the system master controller HMI indicating that loss of LSG digester fuel availability signal occurred and whether the engine-generators were transferred to the combined fuel configuration. Provide the equivalent signals to the SCS. If at any point in this configuration of operation, the gas availability signal is restored, an annunciation shall be initiated by the master controls for indication at the same locations noted above. The engine-generator loading control in this configuration can be done via the SCS or master controller HMI interface.

f. HIGH LSG PRESSURE OR EXCESS FUEL AVAILABILITY: If more gas is being produced than is being consumed, the LSG pressure fuel availability signal will rise. If all of the available engine-generators are already in operation, the system master controller shall cause the operating engine-generators to be loaded to the maximum. If the situation persists, the SCS plant external control system will control waste gas burners to maintain the upstream gas storage pressure at a level above the normal control range. This control function will have no impact on the cogeneration system control. A status input to the system master controller will be provided as a notification that the waste gas burner has been engaged. The system master controller shall incorporate this as a warning status in the control HMI.

g. NATURAL GAS BACKUP SYSTEM: The natural gas system is designed as a supplemental fuel system for use when there is an insufficient supply of digester gas to provide the required power generation. Natural gas is presently not available at the site; therefore, it is possible that this option will never be used. The Supply Contractor shall provide a control configuration selector in the system master controls that allows the combined fuel configuration of control to be disabled in the event that natural gas is not available. This control shall allow enabling of this mode of control by an operator at any time that natural gas does become available. Include status indication of this control selection at the system control level and make it available as a status output signal to the plant SCS.

h. SELECTION OF SUPPLEMENTAL NATURAL GAS: Provide the controls and capabilities to smoothly switch from digester gas only to supplemental use of natural gas from 0 to 100 percent and back to digester gas while under load. The percentage of natural gas shall be as required to

meet the power loading setpoint established for engine-generator loading in this mode of operation assuming full usage of available digester gas fuel first.

i. In the case of a loss of utility power, the engine-generators' controls shall have the capability to switch to island mode operation; at this time, the engine-generators shall remain in the fuel configuration that was selected before the loss of utility power. If that fuel configuration is determined to be insufficient for standby operation, plant staff shall have the option to shift from digester gas to natural gas (or diesel as applicable) if this fuel is available.

J. AUXILIARY SYSTEM REQUIREMENTS:

1. General: The Supply Contractor shall provide with his proposal, details and proposed arrangement of all engine auxiliary systems.
2. Heat Recovery: The engine-generator system is to recover heat from the engine cooling system. The engine cooling system recovers heat from the engine jacket, exhaust, and the oil cooler for use by the plant heat loop system. Provide a heat exchanger to transfer engine cooling system heat to the plant heat loop. The engine cooling system is to use a closed loop including an expansion tank, engine-driven pump, means for adding makeup water and chemical treatment, and heat exchanger.
3. Jacket Water System: The engine cooling system is to function properly with the cogeneration plant heat loop. Water from the plant heat loop will enter the engine heat exchanger at 170 degrees F and plant heat loop water is to leave the engine heat exchanger at up to 230 degrees F when the engine is at full load. Heat loop water will be circulated through the engine heat exchanger at a constant flow rate. At less than full load, the leaving water temperature will drop as engine load drops.
4. Intercooler Heat Recovery: Intercooler (or aftercooler) heat will be rejected to a separate heating system water circuit to provide cooling. A heat exchanger, pump, and control valve shall provide a constant flow of constant temperature heating water to cool the intercooler heat exchanger. Provide a waste heat radiator and controls to provide up to 100 percent supplemental cooling when necessary. Heat loop water to the intercooler will be provided at 130 degrees F or less.
5. Oil Heat Recovery: Oil heat shall be recovered and transferred to the plant heating system. Plant heating water shall be circulated through the intercooler. The maximum plant heat loop temperature is expected to be 170^0F. A waste heat radiator shall be provided to provide up to 100 percent of the cooling required by the oil heating system.
6. Exhaust Heat Recovery: The exhaust heat recovery system shall be designed to recover the heat available from exhaust gases while maintaining a leaving exhaust temperature of at least 350^0F at any load between 50 and 100 percent of full load. The exhaust heat recovery system may be piped in series with the jacket water system or as a separate system. As a separate system plant heat loop water would be circulated through the heat recovery system after passing through the jacket water heat exchanger.
7. Supplemental Silencing: A bypass valve will direct gases around the heat recovery silencer when exhaust heat recovery is not needed or when the heat recovery silencer is being maintained. The supplemental silencer shall be designed to handle all exhaust gas whether bypassing or flowing through the heat recovery silencer and provide the necessary silencing specified here. The system is to be designed so that sound emanating from the exhaust stack, at elevation 45 feet, as measured radially 50 feet from the exhaust tip at 90 degrees from the direction of exhaust flow shall not exceed the following sound pressure levels:

Octave band center frequency, hertz	Sound Pressure Levels, dB (re:20uPA)
63	70
125	60
250	52
500	46
1000	43
2000	42
4000	42
8000	44

8. Waste Heat Radiators: The waste heat radiators shall be designed to use ambient air to waste any amount of heat from 0 to 100 percent of that generated by the system. Waste heat radiators

are required for jacket water, oil cooling, and intercooling. The waste heat radiator for jacket water shall be designed to handle the engine jacket heat load plus the exhaust heat recovery silencer heat load if the Supply Contractor decides to eliminate the bypass valve and send both the jacket heat and the exhaust heat to the jacket heat exchanger and the jacket water waste heat radiator. Waste heat radiators shall be able to provide sufficient cooling to remove 110 percent of the anticipated peak load for the system involve form a coolant mixture of 30 percent ethylene glycol and water, at a flow rate and maximum temperature determined by the Supply Contractor. Split core radiators to handle two systems are allowable. The pressure drop through the waste heat radiators and the characteristics of the 3-way control valves shall be as determined by the Supply Contractor. The system is to be designed so that sound emanating from the radiators shall not exceed the following sound pressure levels at 25 feet:

Octave band center frequency, hertz	Sound Pressure Levels, dB (re:20uPA)
63	84
125	74
250	66
500	60
1000	57
2000	56
4000	56
8000	58

9. The Supply Contractor shall provide system design information for the following systems as applicable to engine being supplied:
   a. Intake, Exhaust and Crankcase Vent
   b. Cooling Water
   c. Jacket Water
   d. Lube Oil Service
   e. Lube Oil Storage
   f. Fuel Service
   g. Fuel Oil Storage
   h. Fuel Gas Service
10. Proposed systems are expected to vary based on the requirements of each proposed engine type. However, the following functional requirements apply to all.
   a. Preference is given to engine-driven auxiliary pumps for lube oil service, jacket water, cooling water and fuel oil.
   b. Engine jacket water system shall have a “keep warm” system.
   c. To simplify system-interconnecting piping, a jacket water loop, which acquires heat from the engine jackets and from the exhaust heat recovery unit, is preferred. The system would have a single plate-and-frame heat exchanger to transfer heat from the jacket water to plant hot water and a waste heat exchange radiator system capable of handling any portion of the cooling needs up to all of the engine cooling needs if the plant heat loop has no need for heat.
   d. Heat exchangers should be plate and frame type of materials suitable for the materials in which they are expected to come into contact.
   e. Lube oil storage and fill system should include interfaces to the engine controls and the master controller for status of valves for filling engine sumps, tank level, etc. In addition, fill lines should be fitted with mechanical, totalizing flow meters to facilitate tracking of lube oil consumption. Storage capacity should be provided sufficient to perform four (4) complete oil changes.
   f. Fuel gas equipment. The Supply Contractor shall include equipment as required to filter, regulate, and provide safety devices for digester gas and natural gas as necessary for fueling the engine proposed. Requirements of NFPA 37 shall be met as shall the requirements and guidelines of FM Global Loss Prevention Standards and FM Global review.
   g. Fuel mixing equipment. The Supply Contractor shall include equipment as required to mix digester gas and natural gas to meet the requirements for performance on any mixture of digester gas and natural gas as the engine primary fuel.

11. A starting air system shall be provided by the Supply Contractor. The system shall be designed to provide 6 starts for one engine without recharging the air storage tank.
12. Auxiliary equipment for this system will also be provided under the installation contract. This will include heat loop pumps, gas compressors, gas dryer, and possible ventilation equipment. Provide controls and monitoring in the controls included in this system for monitoring and controlling that equipment identically to that specified for auxiliary equipment in paragraph 2.01 E. 6 of this specification section. In addition, include provisions to monitor a minimum of two alarm monitor points for each of these. The equipment to be controlled or monitored and the input/output requirements will be defined after contract award. Assume that the controlled equipment will be included in the system start and shutdown sequence controls and assume that there will be a minimum of six driven equipment items to be controlled and/or monitored.

2.02 HARDWARE REQUIREMENTS

A. The Supply Contractor shall provide equipment which meets the functional requirements as listed in section 11093 2.01. In addition, proposed equipment shall offer features of design, construction and/or installation, which equal or exceed those listed in this section.

B. ENGINE-GENERATOR:
   1. Reciprocating Engine:
      a. The proposed internal combustion engine shall be a reciprocating, lean-combustion, spark-ignited or compression-ignition, turbocharged and after-cooled, medium-speed (900 rpm) engine. The engine should be the manufacturer's latest product offering and feature enhanced combustion technology to reach low emissions levels and stable operation suitable for electrical generator service.
      b. Candidate engines will have demonstrated successful operation while fueled with digester or landfill gas, including more than 25,000 hours of successful operation.
      c. Proposed equipment shall be new. No rebuilt or remanufactured equipment, assemblies or components will be accepted.

C. ELECTRICAL GENERATOR:
   1. The generator proposed shall be a 13.8 kV, 2/3 pitch, revolving field, suitable for resistance grounding, with brushless exciter including permanent magnet pilot exciter. Total harmonic distortion shall not exceed 2 percent.
   2. Generator to have NEMA class F insulation.
   3. Temperature rise rating to be 70 degrees Celsius by resistance in 50 degrees Celsius ambient. Generator to be continuous duty rated for full time 24 hours per day, 7 days per week, 52 weeks per year operation.
   4. The generator is to be NEMA MGl dripproof design with guard screens.
   5. Bearings to have minimum AFBMA L-10 rating of 100,000 hours.
   6. The insulation to be resistant to attack by moisture, acids, alkalies, abrasives, and mechanical and thermal shock.
   7. Leads to be insulated with a non-wicking, non-hydroscopic elastomer material.
   8. The generator to be capable of sustaining a short circuit current of 3 times rated current for a minimum of ten seconds.
   9. Acceptable products include Kato Manufacturing, Ideal Electric, or approved equal.

D. ENGINE-GENERATOR TERMINAL BOXES:
   1. Provide separate terminal boxes for the medium voltage cable terminations, the surge arrestor, the low voltage power and control cable terminations, and for signal level terminations.
   2. All wiring from the engine-generator that requires connection externally to the unit is to be terminated in terminal boxes as specified here.
   3. The medium voltage terminal boxes to be NEMA 12, sized with ample space for stress cone terminations, current transformers, and connections for the surge arrestors as required. The generator phase leads are to be connected via the current transformers and terminated on silver plated copper bus bar supported on plastic insulator bushings.

E. INSTRUMENT TRANSFORMERS:
   1. Provide a current transformer for phase reference for the excitation controls.

2. Provide generator differential protection current transformers to be mounted in the terminal box. Include a mounting bracket for this CT and install as required.
3. Wire the secondary conductors of this CT to terminals with shorting provisions in the low voltage terminal box.

F. THERMAL DETECTORS:
1. Provide two RTD thermal detectors in each phase embedded within the stator windings.
2. Provide RTD thermal detectors for the generator bearings.
3. Bring the leads out to terminal strips within the signal level terminal box.
4. RTD's to be 100 Ohm flat laminated platinum with three insulated stranded copper leads.
5. Include an RTD monitoring unit or equivalent control to provide discrete outputs.

G. EXCITER:
1. The brushless rotating exciter portion of the generator is to be conservatively rated for the forcing characteristics required to maintain generator terminal voltage at the specified levels during loading transients.
2. Exciter is to be capable of supplying three times rated generator output current for ten seconds into an external three-phase fault.
3. The exciter windings to be of similar construction to the generator field windings and insulation to be NEMA Class F.
4. Mount the rectifiers on a suitable heat sink and locate them such that they are accessible for replacement by removal of inspection covers.

H. EXCITATION CONTROLLER:
1. Provide an excitation controller for each generator.
2. The excitation controller is to modulate the generator voltage and reactive current output by controlling the field excitation via the exciter's output.
3. The permanent magnet generator included with the generator is to provide the input to the excitation controller.
4. The following functions are to be included in the overall control system. These functions may be provided by a single unit or as separate coordinated devices.
   a. Voltage regulation
   b. VAR/power factor control
   c. Under-frequency / over-voltage protection
   a. Paralleling compensation
5. Acceptable products include, Basler Electric, “Digital Excitation Control System,” or approved equal.
6. Voltage Regulator:
   a. Voltage regulator to be solid state three phase sensing with +/- 1 percent regulation accuracy over full range of generator loading with a maximum 17 millisecond response time.
   b. The regulator to be adjustable within +/-5 percent of nominal voltage.
   c. Generator three-phase line voltage shall be made available from 100:1 generator switchgear potential transformers furnished per specification section 16346.
   d. Include spike suppression as required for the PMG input.
   e. Include provisions for both automatic and manual voltage control for both unit and parallel operation and for synchronization control.
   f. Include stability adjustment to allow setting of the regulator response.
   g. Voltage regulators are to be located at the engine-generators. The unit voltage regulator reference adjustment controls are to be back panel mounted.
   h. Unit voltage output reading is to be included at the local engine-generator panel display.
   i. Voltage regulator to be DEC-100 as manufactured by Basler Electric, or approved equal.
7. VAR/Power Factor Controller:
   a. Controller to be suitable for use in conjunction with the voltage regulator.
   b. Controller to provide a choice of VAR or Power Factor control.
   c. The VAR/power factor controller to be a static device and to control VAR or power factor within +/- 5 percent of maximum rated current.
   d. Controller to offer digital communications capabilities and will as a minimum communicate to the Master Controller kVAR, PF, mode and status. Adjustment of the VAR / PF setpoint shall be possible from the Master Controller.

e. Provide a manual-automatic selector switch at the master control panel to allow selection of the auto control mode.
f. Include a contact on this switch to allow its position to be monitored by the system master controller and SCS.
g. The automatic mode of VAR/PF control is to be inhibited when the switch is not in the AUTOMATIC position.
h. The remote VAR/power factor setpoint and actual plant power factor is to be available at the system master controller HMI.
i. The selector switch is to be heavy-duty oil tight type per specification section 16825.
j. Provide a KiloVAR/ power factor meter or indication via the HMI for the cogeneration system overall VAR/PF output at the master control panel.
k. The plant power factor signal will be made available to the master system control here via SCS.
l. The VAR/PF control resolution is to be a minimum of .1 percent.
m. VAR/PF ramping rate is to be adjustable and set to approximately 25 percent per minute in the automatic control mode.
n. Current transformers as required for monitoring generator current are to be included with these controls.
o. Current transformers are to be mounted in the generator terminal boxes.
p. For the plant VAR/power factor setpoint control, include supervisory protective limits to prevent under or over excitation of the generators in response to the setpoint control.
q. Include alarms for where the limits are reached.
r. The local VAR/PF controllers are to be located at the engine-generators. The local VAR/PF controls are to be back panel mounted.
s. Unit VAR/PF information is to be made available at the local engine-generator panel HMI.
t. The VAR / Power factor controller can shall be a Woodward Governor Digital Synchronizer and Load Control (DSLC), Basler Electric DEC-100 unit or approved equal.

8. Under-frequency / Over-voltage Protection
   a. Provide under-frequency / over-voltage (volts per hertz) protection to be used in conjunction with the voltage regulator. The protective module is to have the capability of reducing regulator output when the generator frequency decreases 4 to 7 hertz (adjustable) below normal.
   b. When the frequency returns to normal value, the regulator output is to automatically increase to provide adequate field current for nominal generator output voltage.
9. Excitation Control and Alarms
   a. Include over and under-excitation limit controls with adjustable time delays.
   b. Include alarm contact and local status indication for all protective functions provided including any equipment self diagnostic features.
   c. All device setpoint and enable switches are to be readily accessible at the equipment.

I. GENERATOR GROUNDING:
1. Generators to each be grounded per ANSI/IEEE C37.101 distribution transformer, high resistance grounding.
2. Provide distribution transformers, resistors, and overvoltage relays as required to provide warning and shutdown level alarms and trips.
3. Transformers and resistors shall have a minimum 15-minute rating.
4. Generator ground fault trips shall trip the generator circuit breakers. Both the ground fault warning alarms and trip alarms shall be included in alarms indication at the switchgear, local engine panel, engine generator panel, and system mater panel and be provided as an output to SCS.

J. ELECTRICAL SYNCHRONIZING EQUIPMENT AND BREAKERS:
1. Status of the circuit breaker positions will be made available to the synchronizing controls via direct hardwire connections from the circuit breakers. These connections are to be circuited outside of any common system microprocessor based control. It is the intent of this specification that the status of the circuit breakers be available whether or not SCS or the system master controller is functional.
2. The status of the controlled circuit breakers is to be indicated at the synchronizing control locations. For the synchronizing controls located in the cogeneration building, this will include

circuit breakers 717-MSG01-01 and each of the generator circuit breakers. For the synchronizing controls located at the existing main switchgear building, this will include circuit breakers 722-MSG01-02 and 722-MSG01-16.

3. Status lights are to be heavy-duty oil-tight per section 16825.
4. Failure of synchronization for each circuit breaker controlled within a programmed maximum time window is to initiate an alarm in the system master controller and at the local engine-generator panel and the engine-generator panel and include provision for remote annunciation at the SCS. For the plant main switchgear synchronizing control panel, provide separate local alarm and indicating lights for this.
5. All indicators and control devices required for manual synchronizing and logical switching functions associated with the implementation of manual control are to be fully wired for independence from the system master controller.
6. Provide voltage indication at the sync control locations for each respective side of each circuit breaker that will have synchronizing controls
7. Provide a circuit breaker operating switch at each manual synchronizing location. Circuit breaker switches are to be heavy-duty switchboard type, with pistol grip type handles. Switches are to include a close position with a spring return to center neutral.
8. Connect the circuit breaker switch close contacts to allow them to be used only in the manual-synchronizing mode. Connect these switches such that manual circuit breaker closure is enabled via the automatic synchronizer's output contact in the synchronizer permissive mode. Structure the control circuit such that the circuit breaker close switch can provide circuit breaker closing control for the various live or dead bus or line configurations applicable to the circuit breaker being controlled.
9. Provide local/remote two position selector switches at the generators switchgear for each generator circuit breaker and the generator main breaker. This selector switch shall be configured to allow control of the circuit breaker close coil either through the local circuit breaker closing switch or via the sync controls circuit breaker switch. In the local mode, this switch shall allow the local circuit breaker switch to close the sync circuit breaker only if one or both sides of the breaker is de-energized per the descriptions that follow. Sync control between live sources shall only be allowed via the sync control panel controls specified here. Provide status indication of this switch position at the sync controls location and include it in the ready for auto sync status. This same level of control shall be implemented for the existing plant main breakers except that others shall provide the selector switch.
10. Generator circuit breakers shall be precluded from closing if any generator malfunction conditions exist from either the generator controller or any protective relay.
11. Provide manual speed adjustment controls with a synchroscope, line and bus voltmeters and frequency meters, and sync lights for verification of synchronization for each synchronizing location.
12. Include complete logical checks with the synchronizing controls to verify that system parameters are in the correct condition for synchronizing when the synchronizing cycle is initiated either in the manual or automatic mode.
    a. Include the status of the circuit breaker, and the circuit breaker local-remote control selector switch in this verification.
    b. Include the status of the frequency and voltage of the engine-generator for the generator circuit breakers in this verification.
    c. Include the status of any other system parameter that is a prerequisite condition for synchronization in this verification.
    d. Include an indicator light for verification that the above conditions have been met for each synchronizing circuit breaker. Indicator light is to be heavy-duty oil tight as specified in 16825.
13. Synchronizing check relays shall be included with the circuit breakers in the new switchgear provided in this system package. Others will provide synchronizing check relays for the existing circuit breakers under a separate contract.
14. Generator synchronizing circuit breakers are to include controls per the following paragraphs:
    a. In the automatic mode, synchronization is to be initiated as noted above. This includes verification that the synchronizing circuit breaker is open, the generator has completed its start cycle, the circuit breaker is in the remote mode of control, and that other circuit breakers in the plant are in the appropriate condition for breaker closure to occur.

b. Include controls to allow these breakers to be closed to a dead bus. Closure of these breakers with deenergized generators to a dead bus shall only be permitted if the generators main circuit breaker is open.
c. Include protective controls to prevent multiple generators from closing to the bus simultaneously when bringing generators on to a de-energized bus.

15. Provide controls for the existing plant main switchgear main circuit breakers 722-MSG01-02 and 722-MSG01-16 per the following paragraphs:
    a. For synchronizing between live buses in the automatic mode, there shall be no initiation via system sequencing controls. Initiation of synchronizing in the auto mode shall be via the auto control enable pushbutton.
    b. Include permissives for the automatic mode that verify that the circuit breaker is open, that both buses are energized, that the circuit breaker control selector switch is in the remote position, and that any other conditions required to allow engagement of the automatic synchronizing controller exist.
    c. Upon initiation of the automatic synchronizing mode, the automatic synchronizer is to be engaged. Provide all controls to allow simultaneous synchronizing of however many generators are running to the SCL source.
    d. In the manual mode, the automatic synchronizer is to be switched to the permissive mode. The manual synchronizing controls are to be enabled.
    e. The generators main circuit breaker 717-MSG01-01 shall be permitted to close live or dead line to dead generator bus only if no generator circuit breaker is in the closed position. The sync controls provided here shall allow this breaker to close live generator bus to dead line.
    f. Provide a synchronizing control panel for the plant main circuit breakers for installation in the existing main switchgear building under the Installation contract.
16. The generators switchgear main circuit breaker shall include control provisions for follow trip control. When existing plant cogen feeder breaker 722-MSG01-1 trips, circuit breaker 717-MSG01-1 shall trip also. A status contact from the cogen feeder breaker will be made available to these controls under the Installation contract.

K. CONTROL PANELS:
1. The Supply Contractor shall provide controls panels as described in this section.
2. Local Engine Control Panels.
    a. Provide a local engine panel for each engine-generator for local engine-generator start and stop control and for readouts required for routine troubleshooting and maintenance activities. These panels are to be for installation at each engine-generator.
    b. Each panel will contain an HMI, control devices specific to the engine controlled, the engine controller (PLC) and controls as necessary for starting/stop of each engine and the engine auxiliary systems. The PLC shall perform as much of the engine control functions as feasible, thereby limiting the number of additional, dedicated control devices required. The PLC shall also act as a data concentrator, making available all engine and auxiliary system data to a data highway and thereby to the other engine's PLC and the Master Control System and SCS as specified.
    c. Each panel shall have an uninterruptible power supply (UPS).
    d. Where start and stop control devices such as pushbuttons and selector switches are used, they are to be heavy duty, oil tight per specification section 16825.
    e. System monitored variables including temperatures, levels, pressures, electrical parameters, etc. are to be available at the units. If these parameters even if some variables are not available for display on the HMI, they are to be made accessible via a communications highway between the engine PLC's and the Master Controller.
    f. The engine PLC will acquire and display on the HMI screen electrical generating parameters including voltage, kW, frequency, VAR and Power Factor and AC current.
    g. The engine PLC will acquire and display on the HMI screen engine operating parameters including but limited to:
        1) Cylinder exhaust temperatures.
        2) Pre-turbine temperature.
        3) Turbine outlet temperature.
        4) Air manifold temperature
        5) Jacket Water temperature in / out of engine and JW cooler.
        6) Lube oil temperature in/out of engine and LO cooler.

7) Cooling water temperature in/out of engine and CW cooler.
8) Air manifold pressure
9) Fuel gas pressure
10) Fuel oil pressure
11) Lube oil pressure
12) Lube oil pressure drop across LO filter.
13) Control air pressure
14) Fuel gas flow (s) rate corrected to SCFM
15) Fuel oil flow rate corrected to GPM
16) See Table I at the end of this specification section for additional monitoring required

h. Provide a top of panel mounted alarm for engine or generator alarms. Provide dual lamp strobe or dual lamp rotating alarm beacons. Include a local reset switch and provision for reset via the PLC.

i. Refer to sections 16010, 16825, 17000, and 17110 for additional applicable requirements for panel construction.

j. Each control panel shall include an HMI to display information for troubleshooting, diagnostics and local manual control. Provide a minimum of 12 graphical interface screens. Screens shall be submitted to the Project Representative for approval and shall include the information indicated in Table I and the following:
1) Start sequence information including permissives
2) Engine data status screen
3) Generator data status screen
4) Heat loops performance screen
5) Fuel system screen
6) Trending screen
7) Plant electrical distribution status
8) Generator electrical parameters screen
9) Alarms and history screen
10) Mechanical auxiliaries status screen
11) Two general diagnostics screens

3. Generator Control Panels

a. Provide a generator control panel for each engine-generator to be located in the new electrical switchgear room. Panels will house electrical controls equipment for each engine-generator including, synchronizing equipment, generator output breaker controls, VA/PF controls, voltage regulators, electrical metering, etc.

b. Provide an engine-generator control panel for each engine-generator.

c. Engine-generator control panels are to include the control devices dedicated to each engine-generator per the requirements of 11093 2.02C.

d. Refer to sections 16010, 16825, 17000, and 17110 for additional applicable requirements for panel construction.

e. Engine-generator control panels are to be a minimum of 72 inches and a maximum of 90 inches high. Maximum width to be 36 inches. Maximum depth to be 30 inches.

f. Engine-generator control panels will be located in the electrical room up to 75 feet in cabling distance from the engine-generators. All control interface requirements between these panels and the engine-generators are to be suitable for operation over this distance.

g. Each engine control panel shall include an HMI to display information as specified here. Provide a minimum of 15 graphical interface screens. Screens shall be submitted to the Project Representative for approval and shall include the information indicated in Table I and the following:
1) Same 12 screens as indicated for the local engine panels
2) Sync controls screen
3) 2 screens to be determined

4. Master Control Panel

a. Provide a cogeneration system Master Control panel for overall system control functions.

b. Cogeneration master control panel is to include the control devices and controls common to the overall generation system.

c. Refer to sections 16010, 16825, 17000, and 17110 for additional applicable requirements for panel construction.

d. Master control panels are to be a minimum of 72 inches and a maximum of 90 inches high. Maximum width to be 48 inches. Maximum depth to be 30 inches
e. Cogeneration master control panel will be located in the electrical room up to 75feet in cabling distance from the engine-generators. All control interface requirements between these panels and the generators are to be suitable for operation over this distance.
f. Provide an audio and visual annunciator that annunciates on alarms directly from the individual engine-generator controls and from system level malfunctions. Include control to allow this annunciator to be acknowledged via the HMI's or from a panel mounted pushbutton. Include variable volume control for the horn.
g. The master control panel shall include an HMI to display information as specified here. Provide a minimum of 25 graphical interface screens. Screens shall be submitted to the Project Representative for approval and shall include the information indicated in Table I and the following:
    1) Same 15 screens as indicated for the engine generator panels
    2) Digester gas production monitor screen
    3) Plant main breakers sync status
    4) Additional trending for system level analog data
    5) System menu screen
    6) VAR/PF system screen
    7) Power/load share status screen
    8) 4 screens to be determined

5. Engine-Sequencing
    a. The engine start-stop sequence includes the starting and stopping of the engines and all required dedicated auxiliary systems including the fuel supply train, heat loop equipment, lubrication systems, ventilation systems, cranking system, radiators, etc.
    b. All controls required to bring each engine up to rated speed and voltage are to be included.
    c. Each engine's sequence control is to be independent of the controls for the other engines such that the starting sequence controls are not subject to common mode failures.
    d. Engine sequence controls that call for the operation of dedicated engine auxiliary equipment are to be directly interfaced to the starters or controllers for that equipment. No control via SCS or the system master controls for this equipment will be allowed.
    e. General sequence control requirements. Include these general features for all of the sequence control specified in the following paragraphs.
        1) Provide graphical interfaces for the control sequences described in the following paragraphs.
        2) The status of all circuit breakers, buses, and equipment that is of significance in the sequencing logic is to be monitored and displayed on the system master controller HMI.
        3) Include sequence malfunction alarm outputs. Malfunction alarms are to be based on a lack of confirmation of response to an output control directive. Alarms shall be specific to each step in the sequence controls such that the step that is malfunctioning is clearly identified. These alarms shall be annunciated at the local engine panels, the engine-generator panels and at the system master controls panel.
        4) Include logic in the sequence control to ascertain that initial conditions in the system are confirmed for each step in the sequence prior to proceeding to the next step.
        5) Include sequence monitoring via the system master controller.
    f. Configure the programmed sequence logic such that all of the monitored and controlled parameters are accessible to the plant controls system (SCS) via the interface between the master controller and SCS.
    g. Provide generator run status and a ready status indication at the local engine panel, engine generator panel, system master controls, and as an output status to SCS
    h. Include provisions to respond to possible equipment protection signals. Also provide other necessary control functions such as time delays, flow proving, alarming on high or low temperature and shutdown and alarm on low pressure. Provide displays at the human machine interface graphic panels per 11093 2.08.
    i. Engine intercooler cooling pump controls. Provide controls from the engine start-stop sequence controller to operate the intercooler cooling pump (provided by others) dedicated to that engine.
    j. Engine heat recovery system. Provide controls from the engine start-stop sequence controller to operate the heat recovery pump (provided by others) dedicated to that engine. A

temperature signal and pressure signal will be made available to this system control by others.

k. Include controls for a minimum of two HVAC units and a jacket water (keep-warm) heater and radiator fans as required per engine.
l. Include controls for the air start compressors
m. Include provisions to monitor the digester gas production signal provided by others
n. As a minimum, each engine is to have a manual-off-automatic engine control switch, lockable in the off position. Switch is to be located at the engine-generator control panel.
o. In the off position, the engine is to shut down through its normal shutdown sequence. Starting to be inhibited.
p. In the manual position, the engine start or shutdown sequence is to be enabled for start or shutdown by manual operator intervention at the engine location or at the engine-generator control panel. The manual mode shall allow a step-by-step start up of the generators allowing an operator to manually engage each step in the start sequence rather than these steps being automated. The sequence logic shall provide indication of the sequence step being engaged and the verification that prior conditions have been met. This mode is primarily intended as a system-troubleshooting mode for start up or to facilitate diagnostics when the system has been put into operation. Controls and indication for this mode of operation to be included at the local engine panel and at the engine generator panel.
q. In the automatic position, the engine is to be started or stopped through each dedicated engine automatic start sequence controller, either by the sequence start or sequence shutdown pushbuttons or via SCS or via the system master controller. The start-stop control via the system master controller is to be either through the master controller HMI or as specified in 11093 2.06. The sequence stop pushbuttons are to be active in either the manual or auto mode of control. In the manual mode, the stop pushbutton shall abort the start sequence and shut down the generator or initiate sequence shutdown. For start stop control capability from SCS via the master controller, provide a local remote control function with status indication to SCS.
r. Include the status of this switch position in the local engine panel HMI and the system master control level as well as provision for monitoring via SCS.
s. Where start and stop control devices such as pushbuttons and selector switches are used, they are to be heavy duty oiltight per specification section 16825
t. The start sequencing controls are to include monitoring of all required system parameters to provide a fully controlled start sequence.
u. Provide timed verification of operation of each step in the sequence to be included.
v. Provide alarms and sequence abort for sequence failures.
w. Provide a warning indication in the event a start is initiated, but the necessary pre-conditions for sequence start are lacking. Indication shall be at the local engine panel, engine generator panel, and the system master panel
x. Provide a cranking cycle countdown for attempted crank cycles in a given start. Indication at local engine panel, engine generator panel, and system panel
y. Provide status indication for each generator in start cycle or shutdown cycle and the particular step or phase of the cycle that the unit is in. Indication at local engine panel, engine generator panel, and system panel.
z. Provide indication at all of the HMI's and for SCS that verifies successful completion of the start sequence. This indicator should be identified as a ready to synchronize status. At this point, unit synchronizing controls specified in 11093 2.02 will take over control of the synchronizing sequence if the synchronizing control selector switch is in the AUTO mode.
aa. Include sequence logic to eliminate pre-start sequence requirements such as an engine pre-lube cycle where it is not necessary to repeat them in the event of restarts within a set time period.
bb. Provide system-sequencing logic to provide a controlled system shutdown for each generator.
cc. Shutdown sequencing to include sequence checks and alarms for each step similar to those required for the start sequence.
dd. Include shutdown control for all auxiliaries included in the starting sequencing.
ee. Include post run cool down and lube cycles in the shutdown sequence as required.
ff. Include control provisions for emergency shut down of the engines.

gg. Contacts from fault relays or other protective relays included by others will be wired by others to these generator controls.
hh. Connect these fault contacts directly into each engine's emergency shut down control, not through any system common control or intermediate control such as a local PLC that is not directly controlling the engine sequencing.
ii. Include provision for an emergency shutdown initiation via the SCS interface and the system master controller HMI. Emergency shutdown initiation from the system master controller or SCS is to be enabled whether the engine control is in automatic or manual.
jj. The emergency shut down is to be immediate, bypassing normal sequencing control.
kk. Provide an emergency shut down alarm.
ll. Provide emergency stop switches at both the engine location and the engine-generator control panels for immediate shutdown of the engines.
mm. Switches to be readily identifiable and accessible and heavy-duty oiltight per specification section 16825.
nn. The generator stop sequence shall also include the shutting down of the fuel supply valves to the engine and shorting out spark ignition if applicable.

L. LOAD SHARING AND SPEED CONTROLS
1. The Supply Contractor shall Load Sharing and Speed Controls (LSSC's) as described in specification. The LSSC equipment should be of the same manufacturer and compatible with the voltage regulating system.
2. LSSC's shall have digital communications capabilities.
3. Acceptable equipment would include the following devices from Woodward Governor Company:
   a. 723 Governor with load sharing (1 each engine).
   b. Digital Synchronizer and Load Control DSLC (1 each engine).
   c. Master Synchronizer and Load Control (1).
4. LSSC's shall be installed in the generator control panels.
5. Master Synchronizer and Load Control shall be installed in the master control panel.
6. Supply Contractor may propose alternatives to the equipment identified in this section but must clearly identify that the equipped proposed meets or exceeds the functional capabilities of the equipment identified herein.

M. PLC'S, DIGITAL CONTROLLERS AND HMI EQUIPMENT
1. The Supply Contractor shall provide programmable controls as described in this section.
2. Programmable logic controller based cogeneration system controls are to be Allen-Bradley, ControlLogix, or Siemens, TI 555. Other PLC manufacturers or series may be proposed in Section 6 for evaluation. Preference will be provided for the specified PLC manufacturers and series, and a price must be provided on Section 6 Form 6-8.8 for one of the specified manufacturers. If proposing an alternate PLC manufacturer and series, then the following must be included in the alternate proposed price on Section 6 Form 6-8.8 and provided:
   a. PLC hands-on training for 15 people at the facility, which at a minimum covers: (1) PLC hardware components function and installation requirements, (2) PLC hardware maintenance and service requirement, and (3) PLC development programming including loading, opening, creating files, saving files; standard commands, navigating tool bars, and customizing toolbars.
   b. PLC spare parts which include:
      1) One (1) control processor unit (CPU)
      2) One (1) power supply
      3) One (1) of each IO module supplied
      4) One (1) of each communication module supplied
3. If Allen-Bradley ControlLogix PLC's are supplied, they are to be purchased by the Supply Contractor from the following vendor, with whom a price has been pre-negotiated by the County:

   Attn. Mikel Osborne
   Reference ITB 02-012, PO 211809
   North Coast Electric
   2424 8th Avenue South
   Seattle, WA 98134

Phone: (206) 682-4444

4. If Siemens TI 555 PLCS are supplied, they are to be purchased by the Supply Contractor from the following vendor, with whom a price has been pre-negotiated by the County.

   Attn: Pat Denny
   Reference: Purchase Agreement 135404
   Cascade Controls Corporation
   18338 Andover Park West
   Tukwila, WA 98188-4707

   Phone: (206) 357-0304, (800) 228 0350

5. HMI/Operator Interfaces: The operator interface with the cogeneration system controls is to be as a minimum, user friendly, logically displayed and organized by function, controls and statuses clearly identified, warning and alarms annunciated and prioritized, diagnostic information displayed, and help information available. Process data is to be displayed in English measuring units. Operator interfaces are to be strategically located to allow remote and local control, monitoring and alarming. At least one industrial workstation is to be provided as centralized operator interface for supervisory control and monitoring of the cogeneration system operation. The display monitor for the workstation is to be no less than 17-inch diagonal. The workstation is to provide real time colorized graphical representation of the cogeneration operation.
6. Operator Interfaces Displays:
   a. Graphic windows are to be computer based real time images that allow operator interface into all functional aspects of the cogeneration system.
   b. Graphic windows are to be included for representing the function of each and every monitored input into the system.
   c. The graphic windows are to include the status of all controlled outputs of the system.
   d. Graphic windows are to include dynamic features for analog values such as power and VAR levels.
   e. Multicolor graphics are required for the workstation.
   f. Provide graphics to cover system overviews such as the overall plant distribution with additional detail screens as required to monitor the detailed operational parameters of the system. Provide detailed level information required for an operator to determine the status of the system to the level that allows system control decisions to be made.
   g. Each screen that has a lower tier of more detailed screens should include provisions to access the next lower tier via a single keystroke or by clicking on a visually highlighted location with the mouse cursor.
   h. Provide graphic alarms capability as follows:
   i. Alarms are to be monitored at all times and displayed on all screens.
   j. Include provisions for multiple alarms by allowing a minimum of four alarms to be displayed on each screen.
   k. Alarms are to be listed in sequence of occurrence. Include the times of initiation of the alarms and the current status.
   l. Provide visual alarm indications on the layout screens that show the alarms in a logical position with respect to the equipment with which it is functionally associated.
   m. The alarms are to be a flashing indication until acknowledged at which time it can go to a steady on representation until cleared.
   n. Include an alarms summary screen that lists alarms in the order of occurrence with time, date, and current status.
   o. Include a menu screen that lists all of the screens included in the system. Include a functional key to allow call up of this screen from any of the sub-screens. From the main menu screen allow any of the listed screens to be accessed in one keystroke.
   p. Include trending capability for analog variables. Trends are to be capable of being called up at a single keystroke or mouse click and are to provide scalable time and variable displays over adjustable time periods.

N. POWER MONITORING

1. A power meter is to be provided for electrical metering of each of the engine-generators and the total engine generator's power distribution. The power meters are to continuously collect, display and communicate real-time and minimum and maximum data. Data is to be displayed at the meter or remotely via a RS 485 serial link with the SCS. The power meter is to be Siemens 9350 Power Meter, revenue class with Ethernet option.
2. The following power monitor data points shall be made available for display at the generators switchgear, the local engine panel, engine generator panel, and at the system master panel:
   1) Generator amps
   2) Generator frequency
   3) Generator kilovolts
   4) Generator kilowatts
   5) Generation kilovar/pt
   6) Generators total amps
   7) Generators bus kilovolts
   8) Generators total kilowatts
   9) Generators total kilovars

O. AUXILIARY EQUIPMENT

1. Jacket Water System: The jacket water system shall use a plate-and-frame heat exchanger to transfer heat to the plant heat loop. A waste heat radiator and control valve shall be provided to handle up to 100 percent of the cooling needs of the jacket water system. All equipment necessary for handling the jacket water shall be provided by the Supply Contractor. The circulation pump shall be engine driven. Heat loop pumps, piping, and control valves will be furnished by others.
2. Intercooler Heat Recovery: The intercooler system provided by the Supply Contractor shall include the heat loop circulating pump and a check valve. The pump shall be designed to handle the pressure losses of the intercooler, any control valves, and the waste heat radiator plus 5 psig of additional head for heat loop circulation. The pump shall be a base mounded end suction centrifugal suitable for continuous heating duty.
3. Oil Heat Recovery: The oil heat recovery system shall use a plate-and-frame heat exchanger to transfer heat to the plant heat loop. A waste heat radiator and control valve shall be provided to handle up to 100 percent of the cooling needs of the oil system. All equipment necessary for handling the oil heat recovery shall be provided by the Supply Contractor. The oil pump shall be engine driven. Heat loop pumps, piping, and control valves will be furnished by others.
4. Exhaust Heat Recovery Silencer: The exhaust heat recovery system will be located horizontally on a mezzanine above the electrical room. The Supply Contractor shall provide an exhaust heat recovery silencer of make and model described herein or equal. The recovery silencer will be a multiple-pass, fire-tube type, hot water service unit with integral silencing capability. Unit will feature removable access covers for ease of cleaning tubes and an explosion relief door on exhaust circuit. Unit Heat recovery silencer shall be a model ECXWV-3880-2 as manufactured by Vaporphase Engineering Controls, Inc. of St. Louis, Missouri or approved equal.
5. Supplemental Silencer: The supplemental silencer shall be designed for horizontal mounting on the roof above the engine-generators. It shall be equipped with necessary drain connections and provisions for flange connections of exhaust piping as well as provisions for installation of insulation.
6. Bypass Valve: The bypass valve for each exhaust system shall be a 3-way valve constructed of stainless steel and shall be designed for at least 200^0F more than the anticipated exhaust temperature. The valve shall be designed to be mounted in the exhaust piping in such a manner that it can be easily maintained. The valve shall be actuated by an air cylinder protected from the exhaust heat. The valve shall be designed for throttling service so that any desired amount of exhaust can be directed to bypass the waste heat recovery silencer. The bypass valve can be eliminated if the Supply Contractor decides to send both the jacket heat and the exhaust heat to the jacket heat exchanger and the jacket water waste heat radiator.
7. Waste Heat Radiators: Waste heat radiators shall be of the "locomotive type" designed for quiet operation. Radiators shall be of steel frame construction with a plenum chamber, rolled fan ring, fan, core guard, filler neck, pressure cap, sight glass, fan and drive guards. The cooling core shall made with brass headers, oval brass tubes, and copper fins solder bonded to the tubes. The radiator cores shall be bonded steel header plates by mechanical expansion. The radiator shall be designed to provide for differential expansion of the core and steel frame. The cooling

core shall be horizontally mounted for upward air flow. Radiator tanks shall be designed for complete drainage and shall be bolted to allow for removal of tanks for cleaning of tubes. The fan shall be forced draft, airfoil design with adjustable pitch and shall be powered by a high-efficiency 3-phase, 480-volt, TEFC motor. The fan shall be v-belt driven.

8. Starting Air System: The starting air system shall consist of two complete air compressor sets with 3-phase, 480-volt electric motors and belt drives. The compressors shall be air-cooled and capable of an operating pressure of at least 200 psig. All accessories required for the system such as air coolers, check valves, unloaders, pressure regulators, pressure gages, controls, and other items shall be included. The pressure regulating system shall be set to maintain the proper air pressure at the engine starters throughout the cranking cycle. The storage tank shall be rated for at least 200 psig and shall bare an ASME stamp. Controls shall cause the storage tank to maintain adequate air pressure and shall cause the backup compressor to start if the lead compressor fails to operate.

P. PIPING AND VALVES:

1. Piping shall be welded and flanged schedule 40 steel conforming to ANSI B16.5, Class 150, for all pipe connections to the engine.
2. Stainless steel piping shall not be painted.
3. Piping shall be painted as follows:
   a. Fuel Oil – Red
   b. Lube Oil – Yellow
   c. Fuel Gas – Orange
   d. Jacket Water – Blue
   e. Effluent Water – Gray
   f. Cooling Water – Green
4. Labeling: Piping will be identified with placards indicating system and direction of flow. Construct fiberglass reinforced plastic identification signs and nameplates of 70 mils thick fiberglass reinforced plastic conforming to ASTM D709.
   a. Provide fiberglass reinforced plastic process with a blemish free, low gloss surface of superior permanence and durability in the colors selected. Provide each identification sign and nameplate in two colors and with the legend specified. Provide the backside of the sign in black or some other uniform color.
   b. Provide lettering made by silk screening or other permanent embedment of subsurface printed graphics in the material so as to produce a clear, legible sign. Do not place lettering, symbols, or markings containing the name of the manufacturer on the signs.
   c. Provide signs for piping and valve identification with two 3/8 inch diameter grommet-protected holes located on the long side centerline, the center of the hole to be 2 inches from the edge. Provide nameplates for equipment and structures with four 3/8 inch diameter grommet-protected holes, the center of the hole located 2 inches away from the edges. Provide all holes with suitable brass or stainless steel grommets.
   d. Construct all signs and nameplates in conformity with ASTM D523, D638, D646, D790, D792 and D5420.
   e. Dimensions of Signs and Tags: Provide identification signs and nameplates rectangular in shape and of the dimensions specified below. A dimensioned tolerance of plus or minus 1/16 inches is permissible.

TYPE OF SIGN	SIGN DIMENSIONS (Width X Length)
PIPE IDENTIFICATION –	
Outside diameter of pipe (including pipe insulation):	
4 inches and larger	3-1/2 x 12 inches
less than 4 inches	1-1/2 x 7 inches
VALVE IDENTIFICATION -	
Valve tags	2 inches diameter
Operating stands for valves and sluice gates	1-1/2 x 7 inches
NAMEPLATES -	
Equipment and structures	3-1/2 x 12 inches

   f. DIMENSIONS OF SIGNS AND TAGS: Provide identification signs and nameplates rectangular in shape and of the dimensions specified below. A dimensioned tolerance of plus

or minus 1/16 inch is permissible. Unless otherwise approved, limit the legend on pipe identification signs to one line and to a total of 12 letters and spaces, and the legend on equipment nameplates to two lines and a maximum of 35 letters and spaces.

Q. EXHAUST PIPING, HEAT RECOVERY AND ENGINE CRANKCASE VENT:
1. The Supply Contractor shall provide heat recovery silencers, and appurtenances, which shall be installed, tested and placed into satisfactory operation by Installation Contractor.
2. The exhaust system will duct exhaust from each of the engines, horizontally to an optional bypass valve, through a heat recovery silencer, through a horizontal supplemental silencer on the roof discharging to a horizontal exhaust stack. Each engine's exhaust system shall be independent of all other sources of exhaust. The exhaust system shall be designed to connect to 304-ELC stainless steel exhaust piping furnished by the Installation Contractor.
3. Crankcase piping will be nominal 3 inches in diameter, schedule 40, provided by the Installation Contractor

R. PROTECTIVE COATINGS:
1. Provide and apply urethane coatings or an approved equivalent factory coating to all equipment. The following are acceptable products:

Manufacturer	Prime Coat	Finish Coat
Porter-International	Magna-Prime 7300 Series	Hythane Fastrack 8900 Series
Glidden	5465 Series	5410 Series
Tnemec	Series 69	Series 74
Ameron	Amerlock 400	Amershield

2. Prepare shop primed surfaces by solvent cleaning. Clean damaged areas by power tool cleaning. Prepare ferrous metal by commercial blast cleaning. Solvent clean and seal with two 36 micron coats of sealer recommended by the coating manufacturer prior to application of prime coats.
3. Apply one or more coats of primer to a dry film thickness of 125 microns (5 mils). Apply one or more finish coats of urethane to a dry film thickness of 50 microns (2 mils).
4. Do not coat stainless steel.

S. SPARE PARTS:
1. Provide a list of spare parts in accordance with Section 01750:
2. Tag and store spare parts in accordance with Section 01750.
3. Provide a parts inventory for both routine maintenance parts and all other engine-generator system parts.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Each engine-generator provided under this contact shall be shop tested in accordance with ASME Performance Test Code (PTC 17) and shall include the following:

B. The testing will be conducted at the manufactures' facilities and will consist of operating the equipment at the design conditions for a period of not less than eight (8) hours. Each engine-generator shall be shop tested as specified and certified shop test reports provided for the Project Representative to review. The report shall identify the tests performed and the results obtained. Prior to scheduling shop tests, the Supply Contractor shall submit a proposed test procedure including a list of measured parameters, test operating points and expected test duration for approval.

C. Factory emissions testing shall be conducted as specified in Section 11093 1.06. Factory emissions testing shall be performed by an emissions testing firm familiar with the testing requirements including PSCAA. The tests shall consist of at least 2 hours each at loads of 100 percent, 75 percent, and 50

percent. The engine-generators shall not be released for shipment until all units have passed the emissions tests and efficiency tests on natural gas.

D. It is the responsibility of the Supply Contractor to ensure that the Engine Manufacturer provides all necessary test and monitoring equipment.

E. The engine-generators shall each be subjected to a Witnessed Factory Test. The Contractor must include in their lump sum price bid for Contract Item No. 1, all costs for lodging, meals, airfare and ground transportation for a total of four (4) representatives from the County.

F. The Supply Contractor will provide not less than four (4) weeks notice to the County prior to factory testing.

3.02 SERVICES PROVIDED DURING CONSTRUCTION

A. Provide services during construction as specified in this Section and in Section 01660 of these specifications.

3.03 INSTALLATION

A. The equipment will be installed by a construction contractor (Installation Contractor) under a separate contract. Supply Contractor services during installation are specified in Section 01660 of these specifications.

B. See Section 01660 for installation and testing requirements.

3.04 FIELD TESTING

A. GENERAL:
1. Operational and performance testing shall be conducted as specified in Section 01660.
2. Test each installed engine-generator system in the presence of the Project Representative.
3. The engineers assigned to the project during the design phase shall be provided as manufacturer's representatives for a minimum of three trips of four days duration each to assist with performance testing.

B. PRETEST PREPARATION:
1. Pre-test preparation shall be as specified in Section 01660.
2. King County will ensure that adequate supplies of natural gas, ULSD, and digester gas are available to operate at least one engine at a time.

C. PERFORMANCE TESTING:
1. Perform tests once the pre-operational checkout procedures are complete and witnessed by the Project Representative. Start the equipment and operate a sufficient period of time to determine machine operating characteristics, including noise, temperature, and vibration; to observe and document performance characteristics; and to permit initial adjustment of operating controls.
2. The testing is to include subsystems performance and control testing with the actual plant loads and distribution equipment. Performances are to be evaluated against the specified performance requirements in this specification.
3. The performance requirements indicated by the Proposer in Section 6 are to be tested with digester gas.
4. Synchronizing controls for the various modes of synchronizing specified in this section shall be tested.
5. Voltage regulation performance and VAR/PF controls are to be tested. The cogeneration VAR/pf control is to be tested as part of the overall plant power factor control system. System VAR sharing controls are to be tested.
6. System load sharing and speed controls and the overall cogeneration system loading controls are to be tested. This test is also to be conducted to verify the overall plant loading control.
7. The engines start and stop sequencing controls are to be tested.
8. All controls associated with the control of auxiliary support systems are to be tested.

9. The graphic interfaces of the HMI's are to be thoroughly checked.
10. All control interfaces and communication requirements between the master controller and SCS are to be tested.
11. All system protective functions are to be tested either by direct actuation or simulation of the conditions.
12. The Project Representative will monitor the results of the tests performed here.
13. The responsibility of the Supply Contractor is to provide the services of an acceptable testing agency and on-site support services to the testing agency with respect to operating the generation system as required to conduct the tests. This is to also include technical assistance for troubleshooting problems in the system that may arise during the performance of the tests.
14. Provide all test equipment required for the performance of these tests. All test equipment must be calibrated and certified as specified in Section 01660.
15. The Supply Contractor and the testing agency shall work with the installation contractor to demonstrate that the installed systems meet or exceed the guaranteed requirements for emissions and transfer from one fuel to another. Also test the system's ability to use fuel mixtures.
    a. An independent firm, acceptable to King County and hired by the Supply Contractor shall measure the emissions of the engines under test conditions. The independent firm will use the installed instrumentation and equipment to measure and record output power of each engine. Emissions at the specified power levels will be measured and recorded by the independent testing firm. The independent firm may be the same as the testing agency if approved for both functions by King County.
    b. Emissions tests shall include tests for at least 4 hours under each of the following conditions for each engine:
       i. 50 percent load
       ii. 75 percent load
       iii. 100 percent load
    c. Fuel mixture tests: Test the ability of each engine to operate at the following fuel mixtures of natural gas or ULSD and sewage digester gas for 50, 75, and 100 percent load conditions:
       i. 100 percent secondary fuel (i.e. natural gas or ULSD)
       ii. 25 percent digester gas, balance with secondary fuel
       iii 50 percent digester gas, balance with secondary fuel
       iv. 100 percent digester gas, pilot fuel with secondary fuel

D. OPERATIONAL TESTING:
1. Work with the installation contractor to test system operation after completion of functional testing and specific performance tests as specified in Section 01660.
2. The field-testing is to include system performance and sequence control testing with the actual plant loads and distribution equipment. The following operation modes will require operational testing.
   a. Cogeneration mode operation in parallel with the Utility
   b. Isochronous and Isochronous load sharing modes.
   c. Black start mode operation
   d. Transitions between modes of operation

E. FIELD OBSERVATIONS: The independent testing firm will provide data sheets for recording observations of emissions tests. The Project Representative will observe all other tests and record the results.

3.05 COMMISSIONING

A. Following completion of the operational testing period and prior to commissioning, remove, clean, and replace all permanent and temporary filters and strainers in the engines and pipeline systems. Drain all fluids from the engines and replace with new fluids, including new additives. Completely clean the equipment supplied prior to turning over to King County. Commissioning shall be conducted as specified in Section 01662.

B. Provide one or more commissioning team members to respond to requests for assistance on the part of the Project Representative or King County. The commissioning team will consist of representatives of the Supply Contractor; the installing contractor's mechanical, electrical, and instrumentation subcontractors; and others as appropriate. Two of the team members from the Supply Contractor shall be the engineers assigned to the project during the design phase. Provide team member at the site during normal working hours for the first two weeks of commissioning. Provide a team member to be available within 2 hours' notice other times during other hours and during the remainder of the commissioning period. The commissioning team member is to be equipped and ready to provide emergency repairs, adjustments, and corrections to the equipment and systems at all times.

C. Develop a detailed, written, plan for the start-up and initial operation, under actual operating conditions. The document will serve as the guidance manual for the commissioning process.

D. The commissioning period is to be 6 weeks. If problems develop during the 6-week period requiring replacement of parts or major adjustments, provide additional commissioning period so that at least the last 3 weeks of the commissioning period is trouble-free. If the commissioning period extends beyond the 6-week period, due to problems with the Supply Contractor's equipment, the Supply Contractor is to pay the installation contractor's additional costs for the extended commissioning period.

E. King County's operation and maintenance personnel will be responsible for operation of the systems being commissioned. The portion of the Work being commissioned is to be fully operational, performing all functions for which it was designed.

F. Be available during commissioning period to provide immediate assistance in case of failure of any portion of the system being operated. Be prepared to make modifications to the system or individual components. At the end of the commissioning period and when all corrections required by the Project Representative to assure a reliable and completely operational facility are complete, the Project Representative will issue a completion certificate. Each system will have been issued a completion certificate as a condition precedent to the Notice of Acceptance of the Work of this Contract.

G. During the commissioning period, King County will be responsible for all normal operational costs. The Supply Contractor shall pay the costs of all necessary repairs or replacements, including labor and materials, required to keep the portion of the plant being commissioned, operational.

3.06 TRAINING

A. King County employs a full time journey level maintenance and operational staff. Staff is on duty at all times, ready to respond to maintenance and operational requirements. As such, this staff requires complete in-depth journey level training on the maintenance and operations of all equipment supplied in this Contract.

B. Maintenance Training: The Supply Contractor shall provide, at a minimum, 24 hours of equipment manufacturer delivered training. Training is to be provided at the West Point facility, over a 3-day period and timed to accommodate all working shifts, including some evenings. Training shall minimally include system operations, preventive maintenance, troubleshooting, and disassembly and rebuild.

C. Operations Training: The Supply Contractor shall provide, at a minimum, 24 hours of equipment manufacturer delivered training. Training is to be provided at the West Point facility, over a 3-day period and timed to accommodate all working shifts, including some evenings. Training shall minimally include system operations and troubleshooting.

D. The Supply Contractor shall submit, in accordance with Section 01300, training syllabus that includes the above requirements proposed dates and times for training and instructor resume. Supply Contractor shall provide this submittal no later than 30 day prior to the requested start date of training. Under no circumstances will training begin less than 14 days prior to the submission of final approved maintenance and operations manuals.

END OF SECTION

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
ANALOG SIGNALS							
Generator Amps		X	X	X	X		O
Generator Frequency		X	X	X	X		O
Generator KiloVolts		X	X	X	X		O
Generator KiloWatts		X	X	X	X		O
Generator VAR's/PF		X	X	X	X		O
Generators total Amps		X	X	X	X		O
Generator swgr KiloVolts		X	X	X	X		O
Generators total KiloWatts		X	X	X	X		O
Generators total KVAR		X	X	X	X		O
Engine speed		X	X	X			O
Btu of gas (if monitored)		X	X	X			O
Fuel flow each engine - digester gas		X	X	X			
total fuel flow for all engines - digester gas				X			O
total fuel flow for all engines - natural gas				X			O
Starting air pressure		X	X	X			
Differential oil pressure across each filter		X	X	X			
Lubricating oil inlet temperature		X	X				
Lubricating oil inlet pressure		X	X				
Intercooler cooling loop temperature		X	X	X			
lube oil cooling loop termperature		X	X	X			
Cylnder temperatures (exhaust)		X	X				
Generator winding temperatures		X	X				
Generator bearing temperature		X	X				
DC control voltage		X	X	X			

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
ANALOG SIGNALS							
Generator Run Time Hours		X	X	X			
System VAR setpoint from SCS				X			I,H
System VAR setpoint to SCS				X			O,H
System WATTS setpoint from SCS				X			I,H
System WATTS setpoint to SCS				X			O,H
Plant power factor				X			I
Plant kW				X			I
MWH each engine			X				
MWH engines total				X			
Gas valves positions % open/ close status (per specs)		X	X	X			
Voltages for sync control at sync panels				X			I,H
Gas pressure in digesters				X			I
Turbocharger speed		X	X	X			

1. Alarm: W(warn), S(shutdown), C(vendor choice)
2. Input from or Output to County external controls H=hardwired

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
CONTROL							
Engine firing and start sequence controller		X					
Gen emergency stop	X	X	X		(via gen prot relay)		
Generator mode selection - Manual-Off-Auto via selector switch			X				
Start and stop auxiliary support equipment		X	X	X			O,H
Hand-Off-Auto selection for auxiliary equipment	X						
Manual Crank -Close-Auto Switch for electric air start valve (spring return Manual Crank to Close)	X						
Initiate electric air start valve operation; when Gen in Man mode & Valve in Auto mode		X					
Open-Close-Auto Switch for fuel valve	X						
Manually Open-Close fuel valve; when Gen in Man mode & Valve in Auto mode		X					
Generator lock out device (air start manual open close valve)	X						
Generator start pushbutton (manual mode sequence start)		X	X	X			X
Generator stop pushbutton		X	X	X			X
Generator unit loading control			X				
Generator system loading control local/remote				X			
Generator system loading control raise/lower setpoint				X			I,H
Generator unit VAR control		X					
Generator system VAR control local/remote				X			
Generator system VAR control raise/lower setpoint				X			I,H
Generators sync control each engine - Run-Off-Test-Permissive select for auto sync			X				
Start auto sync pushbutton - for plant main brkrs only				X			
Circuit breaker close switch - for manual sync				X			
Circuit breaker local/remote selector switch					X		
Manual sync controls				X			

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
CONTROL							
Generators sync conrol bus level				X			
Generators power monitiors					X		
Generators protection relays					X		
Adjust engine tuning		X					
Run diagnostics		X					
Select digester gas or combined fuel mode				X			X
Disable combined fuel mode				X			
Cogen mode man/auto loading select				X			
Acknowledge alarm with indication		X	X	X			
VAr/PF Auto/Manual select swtich				X			
User time delay setting for add and delete engines				X			
User time setting for engine light loading duration in standby mode				X			
User time setting - switch to combined fuel mode in standby				X			

1. Alarm: W(warn), S(shutdown), C(vendor choice)
2. Input from or Output to County external controls H=hardwired

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
STATUS INDICATORS							
Generator in Auto mode		X		X			X
Generator in Manual mode		X		X			X
Auxiliaries in Auto mode (for each aux equip, unit level and system level aux's)		X	X	X			
Auxiliaries in Run mode (for each aux equip, unit level and system level aux's)		X	X	X			
Auxiliaries Ready (for each aux equip, unit level and system level aux's)		X	X	X			
System load controls in auto			X	X			O
System load controls in manual			X	X			
System VAR control in auto			X	X			O
System VAR control in manual			X	X			
Sync control in auto (for each sync control)			X	X			
Generator Ready for start		X	X	X			X
Generator running		X	X	X			X
Fuel valve open		X	X	X			
Fuel valve control switch in auto position		X	X	X			
Generator breaker open		X	X	X	X		O
Generator breaker closed			X	X	X		O
Generator breaker Remote		X	X	X	X		
Generator in start cycle		X	X	X			
Generator in shutdown cycle		X	X	X			
Island mode operation		X	X	X			X
Parallel to grid operation		X	X	X			X
Starting cycle cranks countdown		X	X	X			
401 generator run status				X			I

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
STATUS INDICATORS							
Power available on the Auxiliaries bus				X			I
Plant main breaker 722-MSG01-02 open				X			I,H
Plant main breaker 722-MSG01-02 closed							I,H
Plant main breaker 722-MSG01-02 Remote							I,H
Plant main breaker 722-MSG01-16 open							I,H
Plant main breaker 722-MSG01-16 closed							I,H
Plant main breaker 722-MSG01-16 Remote							I,H
Breaker 722-MSG01-01 open				X	X		I,H
Breaker 722-MSG01-01 closed				X	X		I,H
Breaker 722-MSG01-01 Remote				X	X		I,H
Breaker 717-MSG01-01 open				X	X		I,H
Breaker 717-MSG01-01 closed				X	X		I,H
Breaker 717-MSG01-01 Remote				X	X		I,H
SCL voltage restored side A				X			I
SCL voltage restored side B				X			I
Digester gas monitioring parameters (to be determined)				X			I
Fuel control mode, digester gas or combined gas		X	X	X			O
Combined fuel mode is disabled				X			O
Ready to sync		X	X	X			
Generator on digester gas fuel only		X	X	X			O
Generator in combined fuel mode		X	X	X			O

1. Alarm: W(warn), S(shutdown), C(vendor choice)
2. Input from or Output to County external controls H=hardwired

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
ALARMS							
Emergency stop indication		X	X	X		S	O
Generator bearing temperature high		X	X	X		W,S	O
Generator winding temperature high		X	X	X		W,S	O
Engine exhaust temperature high		X	X	X		W	
Low DC (control power)		X	X	X		W	
Engine oil level low		X	X	X		W,S	O
Engine oil level high		X	X	X		W	
Oil pressure low		X	X	X		W,S	O
Engine oil temperature high		X	X	X		W,S	O
Oil filter differential high		X	X	X		W,S	O
High coolant temperature		X	X	X		W,S	O
Low coolant temperature		X	X	X		W	
Jacket water pressure high		X	X	X		W	
Jacket water pressure low		X	X	X		W	
Low fuel pressure		X	X	X		W	
High fuel pressure		X	X	X		W	
Start conditions lacking		X	X	X		W	
Exceed crank cycle limit		X	X	X		W,S	O
Misfiring detection		X	X	X		W	
Generator overcurrent		X	X	X	X	S	O
Generator over voltage		X	X	X	X	S	O
Generator under voltage		X	X	X	X	S	O
Overcrank		X	X	X		S	O

Monitoring and Controls Functions Listing

	At driven or local equipment	At local engine panel	At engine-generator panel	At system level panel(s)	At switchgear	Alarm [1]	Input or Output [2]
ALARMS							
Overspeed		X	X	X	X	S	O
Underspeed		X	X	X	X	S	O
Generator ground fault		X	X	X	X	W,S	O
Any other gen protect relay trip		X	X	X		S	O
Controller Communications fault (each controller)		X	X	X		W,S	O
Controller general fault (each controller)		X	X	X		S	O
Fail to sync		X	X	X		W	O
Gen bus trip due to power grid transient		X	X	X		W	I
Battery charger alarm	X	X	X	X		W	
UPS alarm	X	X	X	X		W	
System common fail alarm				X		S	O
Need to add an engine generator			X	X		W	O
Need to drop an engine generator			X	X		W	O
Generator dropped due to low fuel available		X	X	X		S	O
System switched to the combined fuel mode		X	X	X		W	O
Loss of gas availability signal				X		W	O
Gas availability signal restored				X		W	O
Gens fail to ride through		X	X	X		W	O
Waste gas burner on				X		W	
Start sequence fail		X	X	X		S	O
Over/Under excitation		X	X	X		S	O
Black start - need to open cogen main brkr 717-MSG01-01		X	X	X		W	O

1. Alarm: W(warn), S(shutdown), C(vendor choice)
2. Input from or Output to County external controls H=Hardwired

SECTION 17132

SINGLE PHASE UNINTERRUPTIBLE POWER SUPPLY EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies on-line single-phase PWM-type uninterruptible power supply (UPS) equipment, 1.0 through 10 kVA output. UPS equipment shall include rectifier/charger, pulse-width-modulation inverter, maintenance bypass switch, meters, controls, indicators, battery, battery rack, and appurtenances.

B. Related Sections: The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to the proper performance of this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.
   1. Section 01730: Operations and Maintenance Manual.

1.02 QUALITY ASSURANCE

A. Referenced Standards: This Section incorporates by reference the latest revision of the following document. It is a part of this Section as specified and modified. In case of conflict between the requirements of this Section and that of the listed document, the requirements of this Section shall prevail.

Reference	Title
IEEE 485	Recommended Practice for Sizing Lead- Acid Batteries for Stationary Applications
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
NFPA 70	National Electrical Code (NEC)
UL1778	Uninterruptible Power Supply Equipment

B. Label: UPS equipment shall bear a UL or other label acceptable to the inspection authority having jurisdiction for the specific application and be UL1778 listed.

1.03 SUBMITTALS

A. Procedure: Section 01300.

B. Catalog cuts showing general features of the UPS and batteries.

C. Battery discharge/recharge calculations.

D. Dimensions and weights of components including working clearances.

E. Block diagram depicting functional operation of UPS.

F. Installation information

G. Wiring Diagrams, internal and external

1.04 PERFORMANCE REQUIREMENTS

A. Equipment output characteristics:
   1. Power factor — 1.0 to 0.8 lagging.
   2. Wave form — Sinusoidal, 5 percent maximum total harmonic distortion.
   3. Voltage regulation — ±2 percent nominal for no load to full load, 1.0 to 0.8 lagging power factor, minimum to maximum DC voltage, or 0 to 40 degrees C ambient.

4. Transient response ±10 percent maximum upon application or removal of 50 to 100 percent load step; recovery to ±5 percent within 50mS.
5. Voltage unbalance ±5 percent with 100 percent load unbalance.
6. Overload capability 200 percent for 10 seconds.
7. Frequency Synchronized to power source. Automatic disconnect at ±0.5Hz; free running ±0.1 percent .
8. Battery charger float voltage 2.25V/cell; recharge time less than 8 hours.
9. Solid-state transfer switch Maximum disturbance time, 1/4 cycle; capacity, 11,000A I^2t.

B. Equipment input characteristics:
1. Normal source 120V, 1 phase, 2W.
2. Operating voltage range +10 percent to –15 percent , (-20 percent without battery discharge).
3. Frequency range ±5 percent.
4. Battery voltage 125V nominal; discharge cut-off at 1.75V/cell.

PART 2 PRODUCTS

2.01 GENERAL

A. UPS and battery shall be housed in a free standing NEMA 250, Type 1, locking caster base enclosure for installation, service, and ventilation.

B. UPS shall be arranged for top entry of all conduits.

C. UPS and batteries as a system shall be capable of carrying 125 percent of the rated load for 10 minutes. Efficiency at full load under normal operation shall not be less than 72 percent. UPS shall have a bypass switch and battery fail alarm.

D. Acceptable Manufacturer:
1. Liebert.
2. Approved equal.

2.02 BATTERY CHARGER / RECTIFIER

A. Constant-voltage type, capable of supplying the UPS direct current bus with no battery attached.

2.03 INVERTER

A. Solid-state pulse-width-modulation type.

2.04 BATTERY

A. Sealed maintenance-free type with 7-year life expectancy.

B. Specific gravity: 1.215 at 25 degrees C.

C. Size in accordance with IEEE 485.

2.05 MAINTENANCE BYPASS SWITCH

A. Fully rated for the UPS capacity and make before break contacts.

B. Mounted external to the UPS cabinet to permit completely de-energizing all components within the cabinet during maintenance.

2.06 INSTRUMENTATION AND CONTROLS

A. Monitoring Instruments: display panel indicator with the following parameters:
   1. Percent load.
   2. Battery reserve.
   3. Input power.
   4. Rectifier/charger.
   5. Output normal status.

B. Alarm Indication:
   1. AC input failure.
   2. Battery low.
   3. Output under voltage.
   4. Output over voltage.
   5. DC bus over voltage.
   6. Bypass on.

C. Alarm Signal Output: normally closed common alarm contact.

PART 3 EXECUTION

3.01 INSTALLATION

A. For UPS's that are installed in control panels specified in Section 11093, installation shall be in accordance with manufacturer's recommendations and per NFPA 70. For field mounted equipment, installation will be by the Installation Contractor.

3.02 TESTING

A. General: Testing to be per Section 01660.

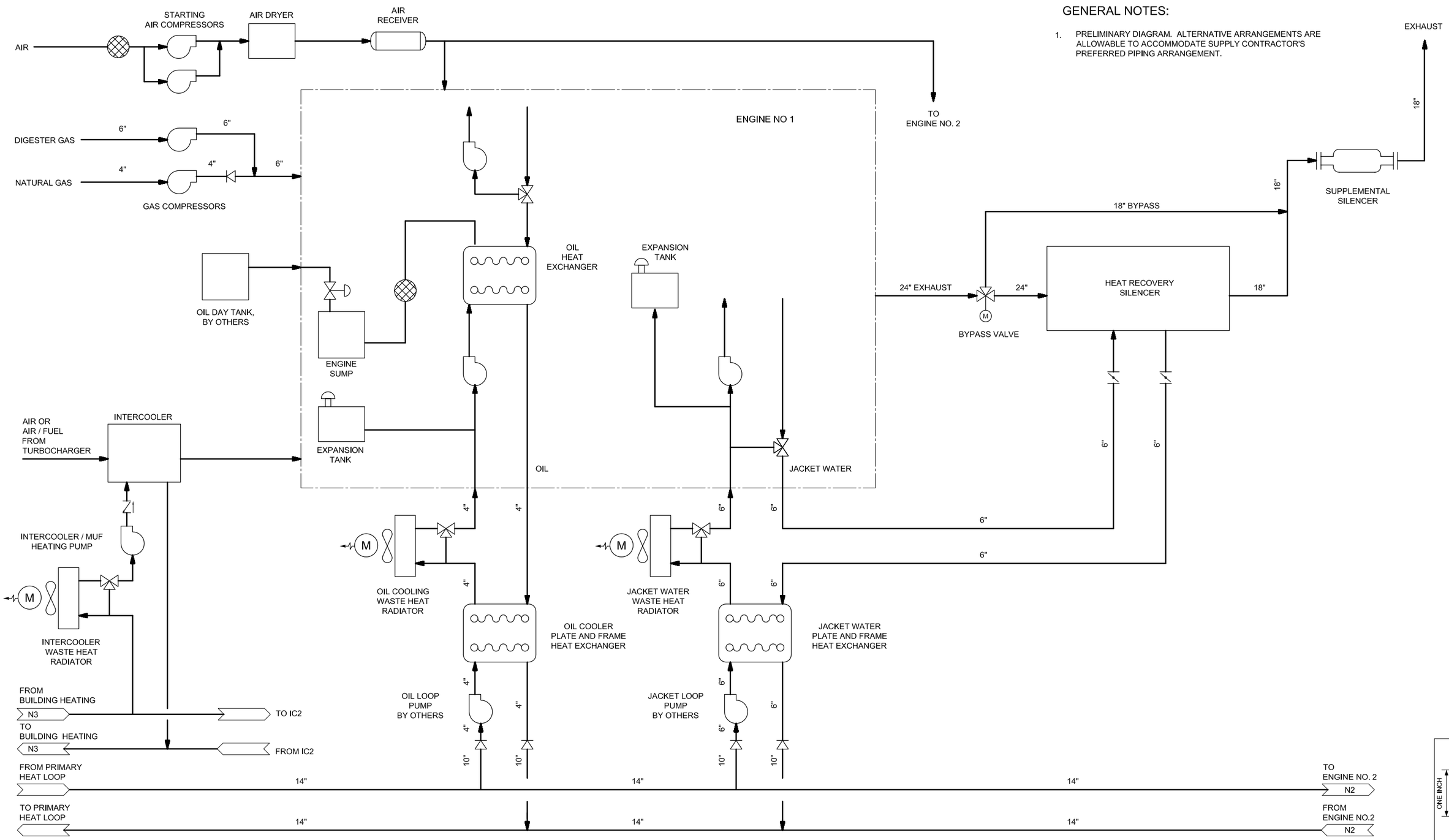
B. System and Equipment Performance Tests
   1. Load Test:
      a. Use 0.8 power factor load bank.
      b. Disconnect AC input and operate UPS at rated load.
      c. Record operating time and battery voltage.
      d Continue operation at rated load battery cut-off.
      e. Monitor battery voltage and record value just prior to cut-off.

   2. Battery Re-charge Test: Connect AC power and record battery specific gravity at end of specified recharge duration.

END OF SECTION

GENERAL NOTES:

1. PRELIMINARY DIAGRAM. ALTERNATIVE ARRANGEMENTS ARE ALLOWABLE TO ACCOMMODATE SUPPLY CONTRACTOR'S PREFERRED PIPING ARRANGEMENT.



No.	REVISION	BY	APP'D	DATE

BROWN AND CALDWELL
and Associated Firms

DESIGNED:
DRAWN:
RECOMMENDED:
APPROVED:
CHECKED:
SCALE: NOTED
CONTRACT NO:

King County

DEPARTMENT OF NATURAL RESOURCES & PARKS
WEST POINT TREATMENT PLANT
POWER GENERATION PLANT

POWER GENERATION PROCESS DIAGRAM

DATE: APRIL 2003
FILE NO:
DRAWING NO: N001
SHEET NO: OF

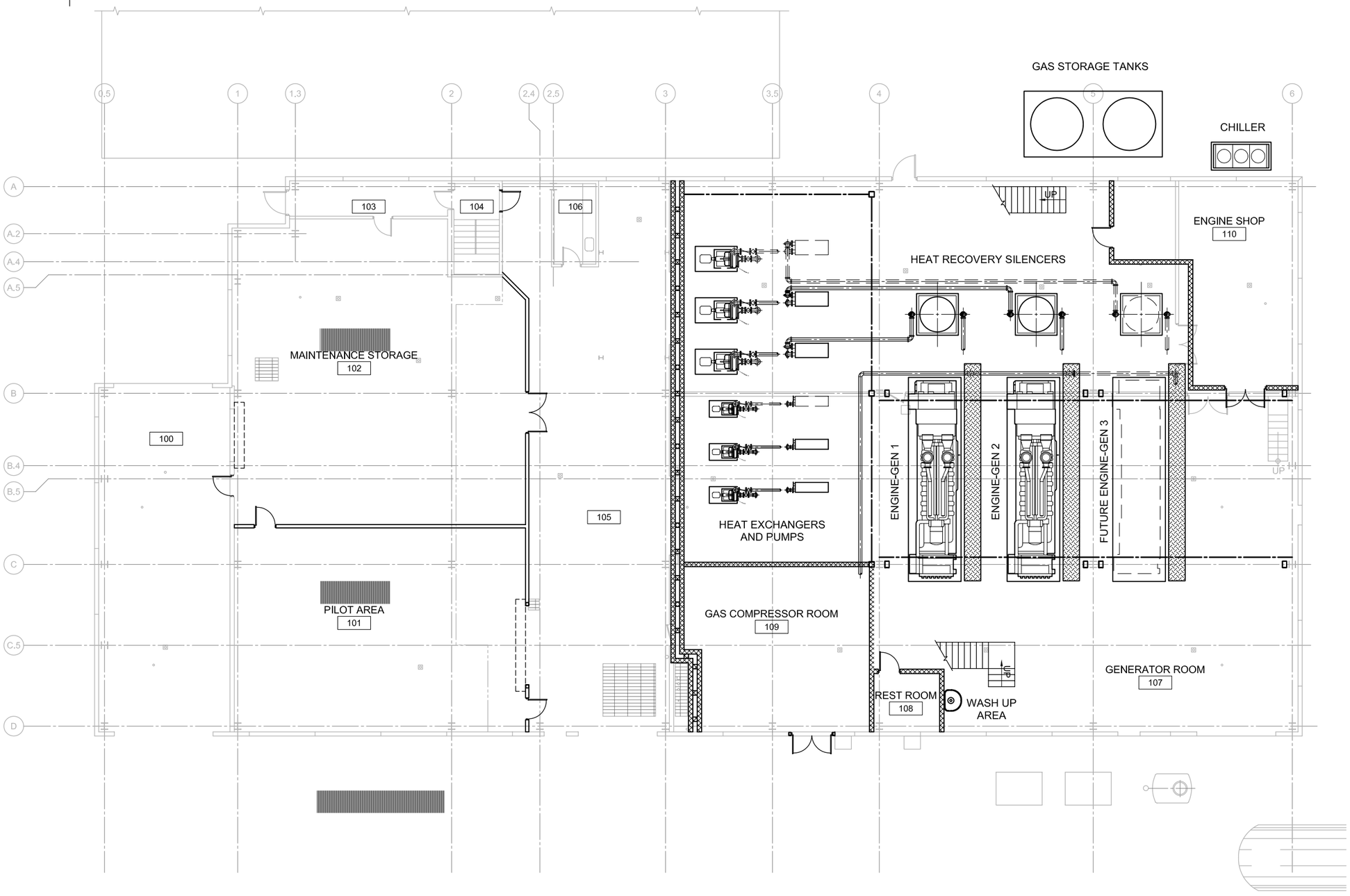
Path: P:\23785 West Point Power_CAD\3-Submittals\RFP 5-21 Filename: N001 Plot date: May 21, 2003-03:32:26pm CAD User: spilanck.
Xref Filename: | 23785-TB |

GENERAL NOTES:

1. GENERAL NOTE ONE .....

KEY NOTES:

(X) KEY NOTE ONE .....



GROUND FLOOR PLAN

SCALE: 1/8"=1'-0"

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

No.	REVISION	BY	APP'D	DATE

BROWN AND CALDWELL
and Associated Firms

DESIGNED:
DRAWN: DSA
RECOMMENDED:
APPROVED:
CHECKED:
SCALE: 1/8"=1'-0"
CONTRACT NO:

King County

DEPARTMENT OF NATURAL RESOURCES & PARKS
WEST POINT TREATMENT PLANT
POWER GENERATION PLANT

MULTI-USE FACILITY
POWER GENERATION FLOOR PLAN

DATE: APRIL 2003
FILE NO:
DRAWING NO: M001
SHEET NO: OF

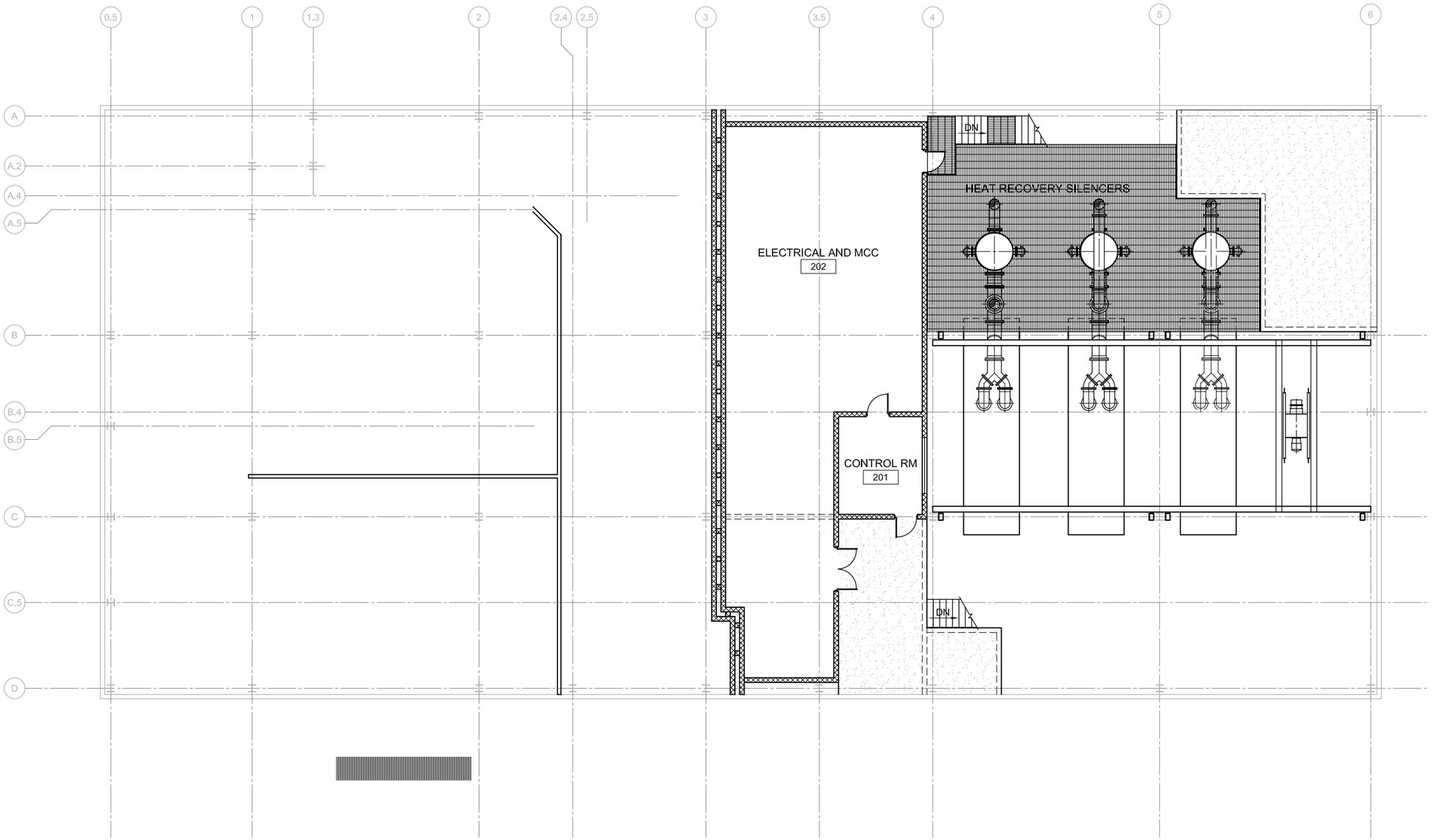
Path: P:\23785 West Point Power_CAD\3-Submittals\RFP 5-21 Filename: WP7171-M-1001 Plot date: May 21, 2003-10:54:28am CAD User: splandic.
Xref Filename: | 23785XS001 | 23785-TB | 23785XS011 | 23785XM011 |

GENERAL NOTES:

1. GENERAL NOTE ONE .....

KEY NOTES:

(X) KEY NOTE ONE .....



PROPOSED SOUTH

MEZZANINE PLAN

SCALE: 1/8"=1'-0"

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

No.	REVISION	BY	APP'D	DATE

BROWN AND CALDWELL
and Associated Firms

DESIGNED:
CHECKED:
DRAWN: SMP
SCALE: 1/8"=1'-0"
RECOMMENDED:
CONTRACT NO:
APPROVED:

King County

DEPARTMENT OF NATURAL RESOURCES & PARKS
WEST POINT TREATMENT PLANT
POWER GENERATION PLANT

MULTI-USE FACILITY
POWER GENERATION SECOND LEVEL PLAN

DATE: APRIL 2003
FILE NO:
DRAWING NO: M002
SHEET NO: OF

Path: P:\23785 West Point Power_CAD\3-Submittals\RFP 5-21 Filename: WP71172-M-1001 Plot date: May 21, 2003-02:10:12pm CAD User: splandic.
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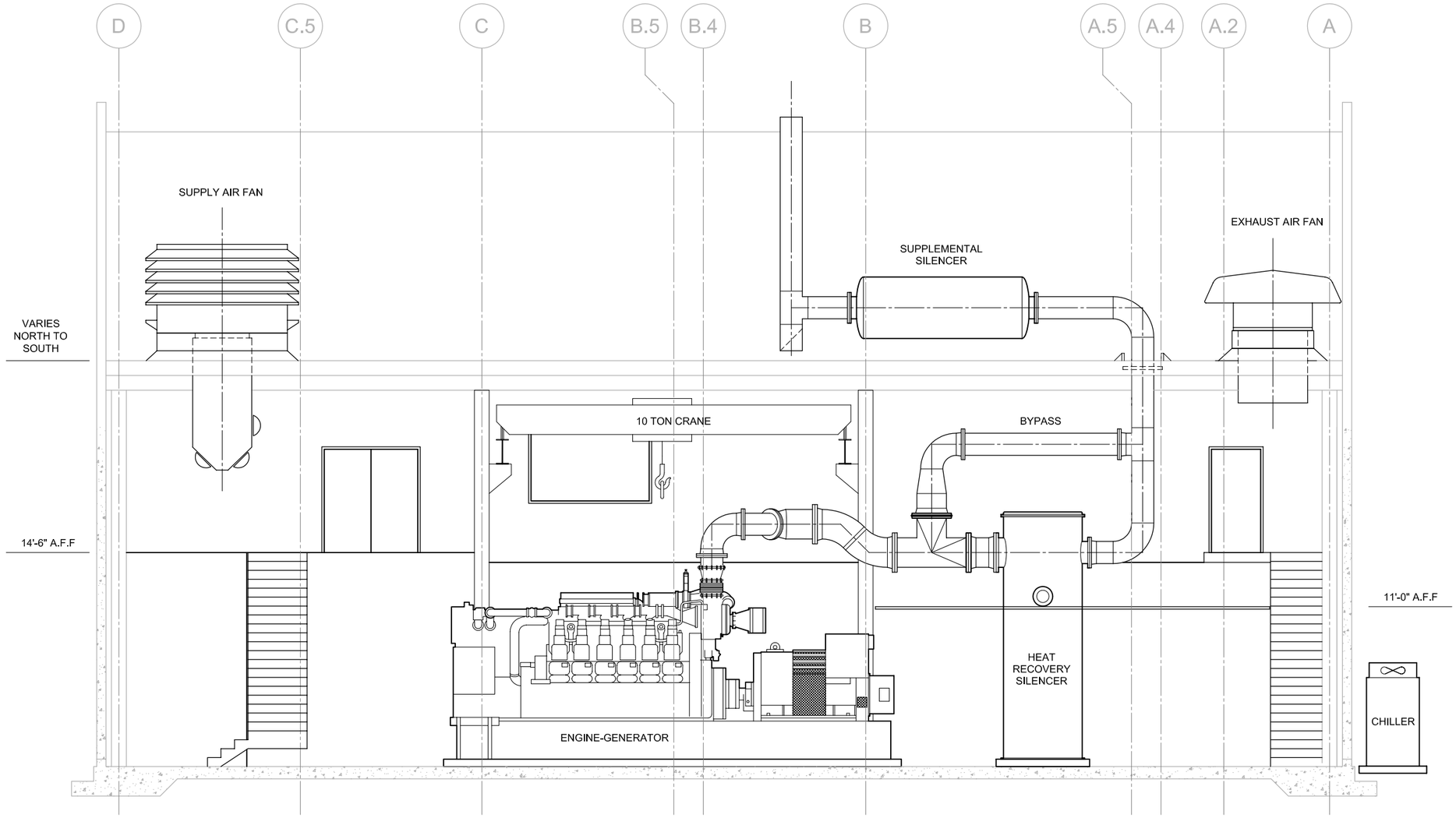
GENERAL NOTES:

1. GENERAL NOTE ONE .....

KEY NOTES:

(X) KEY NOTE ONE .....



SECTION 1 WP7171-M-1001

SCALE: 1/4" = 1'-0"

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

No.	REVISION	BY	APP'D	DATE

BROWN AND CALDWELL
and Associated Firms

DESIGNED:
DRAWN: DSA
RECOMMENDED:
APPROVED:
CHECKED:
SCALE: 1/8"=1'-0"
CONTRACT NO:

King County

DEPARTMENT OF NATURAL RESOURCES & PARKS
WEST POINT TREATMENT PLANT
POWER GENERATION PLANT

MULTI-USE FACILITY
POWER GENERATION SECTION

DATE: APRIL 2003
FILE NO:
DRAWING NO: M003
SHEET NO: OF

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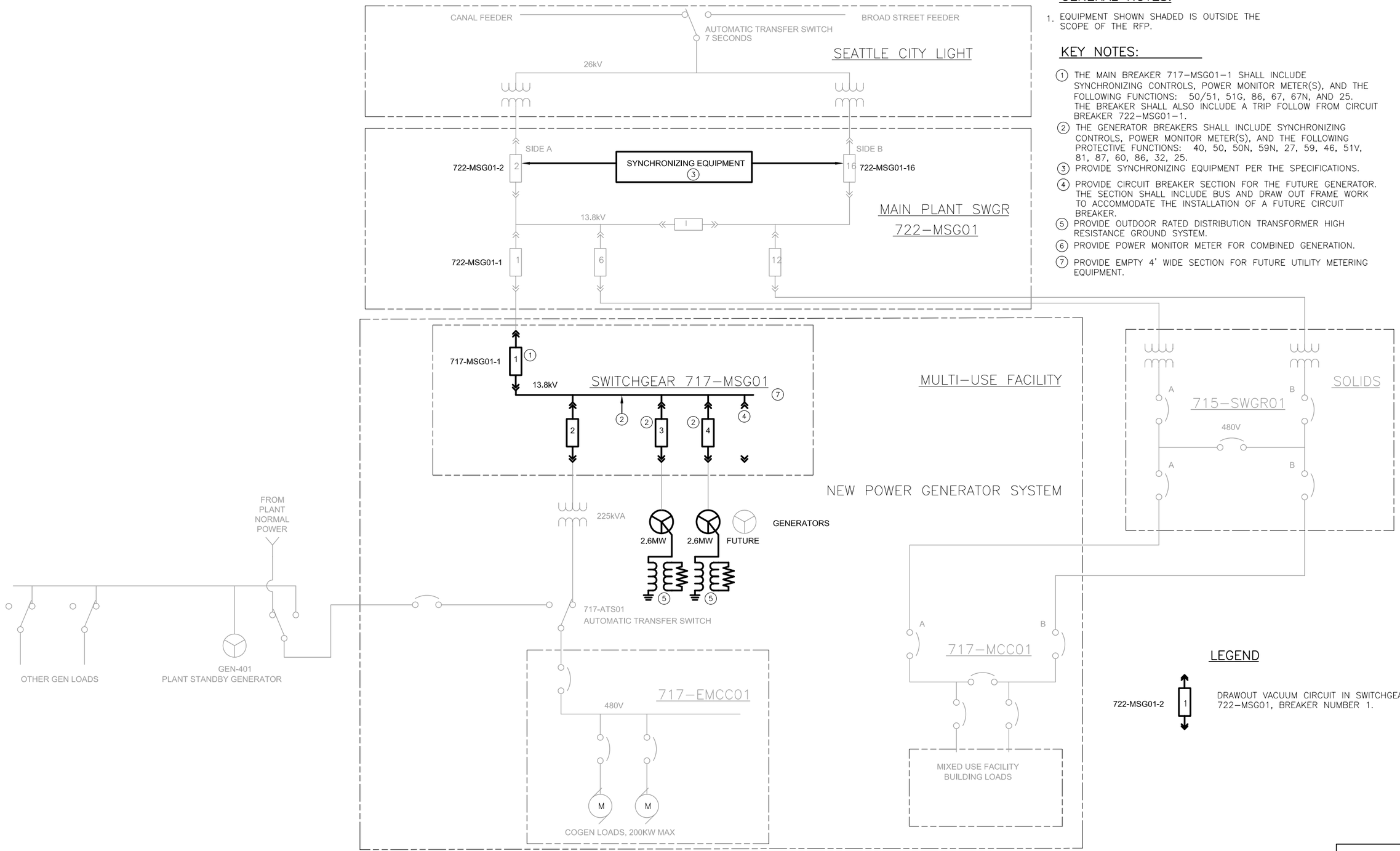
Xref Filename: | 23785-TB | 23785XM201 |

GENERAL NOTES:

1. EQUIPMENT SHOWN SHADED IS OUTSIDE THE SCOPE OF THE RFP.

KEY NOTES:

1. THE MAIN BREAKER 717–MSG01–1 SHALL INCLUDE SYNCHRONIZING CONTROLS, POWER MONITOR METER(S), AND THE FOLLOWING FUNCTIONS: 50/51, 51G, 86, 67, 67N, AND 25. THE BREAKER SHALL ALSO INCLUDE A TRIP FOLLOW FROM CIRCUIT BREAKER 722–MSG01–1.
2. THE GENERATOR BREAKERS SHALL INCLUDE SYNCHRONIZING CONTROLS, POWER MONITOR METER(S), AND THE FOLLOWING PROTECTIVE FUNCTIONS: 40, 50, 50N, 59N, 27, 59, 46, 51V, 81, 87, 60, 86, 32, 25.
3. PROVIDE SYNCHRONIZING EQUIPMENT PER THE SPECIFICATIONS.
4. PROVIDE CIRCUIT BREAKER SECTION FOR THE FUTURE GENERATOR. THE SECTION SHALL INCLUDE BUS AND DRAW OUT FRAME WORK TO ACCOMMODATE THE INSTALLATION OF A FUTURE CIRCUIT BREAKER.
5. PROVIDE OUTDOOR RATED DISTRIBUTION TRANSFORMER HIGH RESISTANCE GROUND SYSTEM.
6. PROVIDE POWER MONITOR METER FOR COMBINED GENERATION.
7. PROVIDE EMPTY 4' WIDE SECTION FOR FUTURE UTILITY METERING EQUIPMENT.



No.	REVISION	BY	APP'D	DATE

BROWN AND CALDWELL
and Associated Firms

DESIGNED: ACR
DRAWN:
RECOMMENDED:
APPROVED:
CHECKED:
SCALE: NOTED
CONTRACT NO:

King County

DEPARTMENT OF NATURAL RESOURCES & PARKS
WEST POINT TREATMENT PLANT
POWER GENERATION PLANT

ELECTRICAL ONE LINE DIAGRAM
POWER GENERATION SYSTEM

DATE: APRIL 2003
FILE NO:
DRAWING NO: E001
SHEET NO: OF

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PROPOSAL LABEL

Complete the form below (or reasonable facsimile) and affix to the exterior lower left hand corner of the submission envelope(s), box(es), etc.

Urgent-Sealed Proposal Enclosed Do not Delay - Deliver Immediately

Proposal Number:	RFP 03-013-PR
Proposal Title:	POWER GENERATION EQUIPMENT
Opening Date:	
Firm Name:	

King County Procurement
& Contract Services Section
Finance & Business Operations
MS EXC-FI-0862

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