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189 Prince William Street
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Saint John
New Brunswick
E2L 2B9

SOLICITATION AMENDMENT MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

Vendor/Firm Name and Address
Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution
Public Works Government Services Canada- Bid
Receiving / Réception des soumissions
189 Prince William Street
Room 405
Saint John
New Bruns
E2L 2B9

Title - Sujet Dorchester, Boiler Plant Upgrade	
Solicitation No. - N° de l'invitation EC016-150402/A	Amendment No. - N° modif. 006
Client Reference No. - N° de référence du client R.061841.001	Date 2014-08-22
GETS Reference No. - N° de référence de SEAG PW-\$PWB-020-3436	
File No. - N° de dossier PWB-4-37032 (020)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2014-09-04	Time Zone Fuseau horaire Atlantic Daylight Saving Time ADT
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Donovan, Janine PWB	Buyer Id - Id de l'acheteur pwb020
Telephone No. - N° de téléphone (506) 636-5347 ()	FAX No. - N° de FAX (506) 636-4376
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	Delivery Offered - Livraison proposée
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

Solicitation No. - N° de l'invitation

EC016-150402/A

Client Ref. No. - N° de réf. du client

R.061841.001

Amd. No. - N° de la modif.

006

File No. - N° du dossier

PWB-4-37032

Buyer ID - Id de l'acheteur

pwb020

CCC No./N° CCC - FMS No/ N° VME

This Tender Amendment No. Six (6) is raised to include the following Addendum No. Six (6).

The following Addendum to the tender is effective immediately. This addendum shall form part of the contract documents.

All other terms and conditions remain the same.

The following responses are being provided for clarification purposes:

General notes:

1. The existing boiler room Natural Gas connection is sized for 8,590kW (29,300MBH).
2. Hydronic piping and valves refer to spec section 23 21 13.02 Hydronic Systems – Steel and drawings M2, M3, M4, & M5 for piping layouts and dimensions.
 - a. **All hot water piping** replace to spec section 23 21 13.02 Hydronic Systems – Steel, page 3, paragraph 2.1.2.2 with the following.
 - 2.2 STEEL PIPING, VALVES AND FITTINGS
 - .1 General:
 - .1 Contractor to supply shop drawings for all grooved end components.
 - .2 Do piping system work including hanger in accordance with ANSI B31.1 or B31.9.
 - .3 Install all grooved end components per manufacturer's latest recommendations.
 - .4 Products shall have current CRN's and heat numbers for the applicable province for all pipeline components.
 - .5 All grooved products to be one manufacturer.
 - .1 Acceptable Materials: Victaulic; Shurjoint; Gruvlock.
 - .2 Pipe Joints:
 - .1 All grooved couplings to be designed with angle bolt pads to provide a rigid joint unless otherwise noted.
 - .2 Acceptable Materials: Victaulic Style 07 Zero-Flex.
 - .3 Victaulic Style 77 flexible couplings shall be used for a maximum of three joints at pumps and circulators for vibration and noise control. They are to be used at expansion loops and offsets intended to absorb pipe expansion.
 - .4 Coupling gaskets to be Grade "E" (EPDM) for water services -31°F to 230°F.
 - .5 Schedule 40 steel pipe throughout.
 - .3 Fittings:
 - .1 All grooved end fittings and couplings to be manufactured from ductile iron conforming to ASTM A536.
 - .2 Acceptable Materials: Victaulic Company of Canada; Shurjoint; Gruvlock; Parker Kaefer Inc.
 - .4 Silent Check Valves:
 - .1 Check valves shall be grooved end 300 psig (2.0 Mpa) minimum working pressure, non-slamming spring-loaded disk.
 - .2 Acceptable Material: Victaulic Style 716 Check Valve, Parker Kaefer Inc s.
 - .5 Balancing Valves:
 - .1 2" and under shall be Y-pattern style design and all metal parts of non-ferrous pressure die cast, non-porous copper alloy. IPS

connections unless otherwise noted. The valve shall have four 360 degrees adjustment turns of hand wheel for maximum setting.

.1 Acceptable Materials: Tour & Anderson Style 787.

- .2 2.1/2" and larger (grooved or flanged connections) shall be Y-pattern style design with ductile iron body, with all other metal parts of non-ferrous copper alloy. The valve shall have (8), (12) or (16) 360 degrees adjustment turns of the hand wheel for maximum setting. Hand wheel shall have digital readout.

.1 Acceptable Materials: Tour & Anderson Style 789 or Style 788, Parker Kaefer Inc.

.6 Butterfly Valves:

- .1 Isolation and control valves shall be grooved end, 300 psig (2.0 MPa) bubble tight shut-off on dead end service meeting the following criteria:

- .1 Valves to be manufactured from ductile iron ASTM A-536.
- .2 Nickel coated ductile iron disk.
- .3 Seat: Grade "EPDM".
- .4 416 stainless steel stem.
- .5 2.1/2" to 6" to have lever lock handles.
- .6 8" to 12" to be supplied with gear operators.

- .2 Acceptable Materials: Victaulic Style 300 butterfly valves, Parker Kaefer Inc.

b. All Feed water piping: to be sched. 80.

- 1. 2" and below to be threaded.
- 2. 2.1/2" and above to be welded with flanged connections.

c. All make-up water piping: to be 316 S.S. as noted in spec. section 23 21 13.02.

Specs:

1. Section 21 05 01 – Common Work Results - Mechanical, page 1, Paragraph 1.1.1:

- a. Revise to read: The Contractor is responsible for all removals, demolition, painting, and tiling (including preparation of surfaces; of all supplementary steel supports, Boiler Room walls, ceiling and the Boiler Room floor), testing, permits, TAB, plumbing, heating, ventilation, electrical, controls and fire protection (if required/if deemed necessary). Only those areas affected during the project are required to be repaired.

2. Section 23 21 23 – Hydronic Pumps, page 2 Paragraph 2.1:

- a. Note: Pumps are to be constant speed, VFD's are NOT required.

3. Spec section 23 52 00 - Heating Boilers:

- a. Revised section see attached.

Drawings:

3. Reference Drawing M2 of 10:

- a. Note: Correct the Fuel Oil Supply (FOS) piping diameter for Boilers (e)B01, (e)B02, B05 and B06 to read 25mm.
- b. Note: The propane piping is to be used for the pilot ignition.

4. Reference Drawing M4 of 10:

- a. New boilers B05 & B06 to be mounted on base rails, concrete housekeeping pads not required for the boilers. Note the existing boilers are mounted on base rails not concrete pads.
- b. The pumps are to be mounted on concrete housekeeping pads.

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Specifications for two (2) typical, Cleaver-Brooks, Model CBEX-200-100-30HW (available from Bruce Sutherland & Associates Limited), non-condensing, dual fuel natural gas and number 2 fuel oil-fired c/w propane gas pilot, hot water heating boilers:
 - .1 Fire tube design c/w O₂ Trim and Internal Flue Gas Recirculation.
 - .2 Low pressure, hot water application, max. 99 deg.C (210 deg.F) operating temperature.
 - .3 Fuel Series 200 - Light Oil (#2) c/w Propane pilot or Natural Gas, high efficient, modulating burners, minimum 4:1 turndown ratio.
 - .4 Start-up, Commissioning and Boiler Efficiency Testing are to be included. Services shall be required on-site, following installation in the Fall of 2014.
- .2 Alternate Manufacturers: Hurst (available from S.C. Delong Sales Inc.) to come with Weishaupt burners or Oilon burners, Superior Boiler Works (available from Coastal Boiler Service Ltd.) to come with Weishaupt burners, Boilersmith c/w Weishaupt burners. Alternate Manufacturers shall meet or exceed all technical requirements. Boilers/Burners shall be factory approved as a package, not field approved.

1.2 REFERENCES

- .1 American Boiler Manufacturer's Association (ABMA).
- .2 American National Standards Institute (ANSI).
 - .1 ANSI Z21.13-2004/CSA 4.9-2004, Gas-fired, low-pressure Steam and Hot Water Boilers.
- .3 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).
 - .1 ANSI/ASME Boiler and Pressure Vessel Code, Section IV, 2004.
- .4 Canadian Gas Association (CGA).
 - .1 CAN1-3.1-77(R2001), Industrial and Commercial Gas-fired, Packaged Boilers.

- .2 CAN/CSA-B149.1 9 (latest edition), Natural Gas and Propane Installation Code.
 - .5 Canadian Standards Association (CSA International).
 - .1 CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code.
 - .6 Electrical and Electronic Manufacturer's Association of Canada (EEMAC).
 - .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- 1.3 SUBMITTALS
- .1 Shop Drawing Data:
 - .1 SPEC NOTE: Include requests for relevant data to be furnished by the Contractor, before, during or after construction.
 - .2 Submit manufacturer's printed product literature, specifications and datasheet for review by the Consultant. Include product characteristics, performance criteria, physical size, shipping weight, operating weight, service clearances.
 - .3 Submit six (6) copies of shop drawings for review by the Consultant.
 - .4 Indicate the following:
 - .1 General arrangement showing controls, piping connections, electrical requirements.
 - .2 Clearances for operation, maintenance, servicing and cleaning.
 - .3 Foundations with loadings, anchor bolt arrangements.
 - .4 Piping hook-ups.
 - .5 Equipment electrical drawings.
 - .6 Burner and controls.
 - .7 All miscellaneous equipment.
 - .8 Flame safety control system.
 - .9 Breeching configuration.
 - .5 Engineering data to include:
 - .1 Boiler efficiency at 25%, 50%, 75% and 100% of design capacity.
 - .2 Radiant heat loss at 100% design capacity.
 - .2 Quality assurance submittals: submit the following:
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions for review.

.3 Closeout Submittals:

- .1 Submit three (3) copies of the operation and maintenance data for incorporation into the O&M Manuals.

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements: work to be performed in compliance with the applicable Provincial Regulations.

.2 Health and Safety:

- .1 Do construction occupational health and safety in accordance with Provincial Regulations.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

- .1 Deliver to site, store and handle in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

1.6 MAINTENANCE

.1 Extra materials:

- .1 Spare gaskets.

1.7 WARRANTY

- .1 The Supplier shall provide a standard 18 months Warranty period from shipment date. This will include all Electrical components and burner components.

Part 2 Products

2.1 GENERAL

.1 Packaged Boilers (2 typ.):

- .1 Complete with high efficiency Dual fuel natural gas and number 2 fuel oil burners c/w propane pilot and all necessary accessories and controls.
- .2 Boilers shall be a complete package, factory assembled and fire tested, shipped to site, and shall be site tested at rated capacity to, and bearing seal or nameplate certifying compliance with CSA B140.7. Testing to be witnessed by the Consultant and the Departmental Representative.

- .3 Ready for attachment to piping, electrical power, controls, flue gases exhaust.
- .4 Designed and constructed to ANSI/ASME Boiler and Pressure Vessel Code, Section IV.
- .5 CRN (Canadian Registration Number) to CSA B51.
- .6 Boiler/burner package to bear ULC, cUL, CGA label.
- .7 Low NOx burner performance: maximum 30 ppm.
- .2 Performance:
 - .1 In accordance with American Boiler Manufacturers Association (ABMA), or ANSI Z21.13/CSA 4.9 (gas burning) testing procedures.
 - .2 Hot water: 1154 kW (3,938 MBH) natural gas input. Gross output: 981 KW (3,347 MBH). 207 kPa (30 psig) maximum operating pressure.
 - .3 Firing rate: natural gas: 112 m³ /h, gas pressure at metre outlet: 5 psig.
 - .4 Boiler efficiency: 84% minimum at 25% to 100% firing rates, manufacturer to provide a \$5,000 rebate for every 1.0% below minimum.
 - .5 Flue gas temperature leaving boiler:
 - .1 Not to exceed 260 degrees C.
 - .2 Above dew point conditions at minimum firing rate.
- .3 Electrical:
 - .1 Power: 575/3/60.
 - .2 Controls: 120 /1/60.
 - .3 Electrical components: CSA approved.
- .4 Advanced ICS-L35E (2 typ.) controls: factory wired. Enclosed in Electrical and Electronic Manufacturers' Association of Canada (EEMAC) 1 steel cabinet, mounted directly on the Boiler.
- .5 Thermal insulation:
 - .1 Min. 50 mm (2") thick fibreglass wool insulation. Seal insulation at hand holes, manholes, mud holes, piping connections with insulating cement or asphaltic paint. Finish with heat resisting paint.
- .6 Jackets: heavy gauge metal, finished with heat resisting paint.
- .7 Mounting:
 - .1 Structural steel base, lifting lugs.
- .8 Anchor bolts and templates:
 - .1 Supply for installation by the Mechanical Contractor.
- .9 Start-up, instruction, on-site performance tests: make allowance for one day.

- .10 Trial usage:
 - .1 Departmental Representative and/or the Consultant may use the Boilers for test purposes prior to acceptance and commencement of warranty period.
 - .2 Supply labour, materials and instruments required for tests.
- .11 Temporary use by Contractor:
 - .1 Contractor may use boilers only after written approval from Departmental Representative and/or the Consultant.
 - .2 Monitor and record performance continuously. Keep log of maintenance activities carried out.
 - .3 Refurbish to as-new condition before final inspection and acceptance.

2.2 FIRE-TUBE BOILERS

- .1 General:
 - .1 Packaged, dry-back, minimum 2 pass, Scotch Marine type, with 29.8 kW/m², total effective fire-side heating surface of 38.7 m².
- .2 Design:
 - .1 Forced draft.
 - .2 Furnace tube centrally located in the Boiler shell.
 - .3 Tube bundle arranged to facilitate water circulation and prevent sludge accumulation.
 - .4 Tubes rolled and beaded into tube sheets, accessible for cleaning and replacement.
 - .5 Combustion chamber: refractory lined.
 - .6 Access for cleaning water side: at least one manhole and adequate number of hand holes.
 - .7 Hinged or davitted and gasketed front and rear heads with access to tube sheets without removal of any front end equipment.

2.3 AUXILIARIES

- .1 Provide auxiliaries for each boiler and to meet ANSI/ASME requirements.
- .2 Hot water boilers:
 - .1 Relief valve(s): ANSI/ASME rated, set at 207 kPa (30 psig), to release entire Boiler capacity.
 - .2 Pressure gauge: 90 mm diameter complete with shut-off cock.
 - .3 Thermometer: 115 mm diameter range 10 to 150 degrees C.
 - .4 Low water cut-off: with visual and audible alarms. Float type with T & C.

- .5 Drain valve: NPS 2.
- .6 Stack thermometer: range 65 to 400 degrees C.
- .7 One set of cleaning tools.

2.4 BURNERS FUEL SERIES 200 - LIGHT OIL OR NATURAL GAS-FIRED

.1 General:

- 1. Burner type - The burner shall be mounted at the front of the boiler and shall be a combination of the low pressure air atomizing type for oil and multi-port type for gas. The burner shall be approved for operation with either CS12-48 Commercial No. 2 oil or natural gas.
- 2. Forced draft with:
 - .1 Built-in blower to supply combustion air, complete with motor, silencer and damper.
 - .2 High voltage ignition transformer.
 - .3 Flame observation port.
 - .4 Easy access to nozzles and electrodes.
 - .5 Turn down ratio of Minimum 4:1.

.2 Gas Pilot:

- .1 The gas pilot shall be a premix type with automatic electric ignition. An electronic detector shall monitor the pilot so that the primary fuel valve cannot open until pilot flame has been established. The pilot train shall include one manual shut-off valve, solenoid valve, pressure regulator and one (1) plugged leakage test connection.

.3 Oil Burner:

- .1 Oil Pump - An oil pump with a capacity of approximately twice the maximum burning rate shall be included. The motor-driven pump set, shipped loose, shall be provided, to be installed in a location favorable to the oil storage tank.
- .2 Oil Burner Piping - Fuel oil piping on the unit shall include oil pressure regulating devices, oil metering controls, low oil pressure switch, two (2) motorized oil valves, and pressure gauges all integrally mounted on the unit.
- .3 Low pressure air atomizing - Separate air compressor module, shipped loose with burner-mounted low-atomizing air pressure switch.
- .4 Burner Turndown - Turndown range shall be 4:1 when firing No. 2 oil.
- .5 Excess air is 25% with 10 ppm CO

.4 Gas Burner:

- .1 Gas Burner Piping - Gas burner piping on all units shall include a primary gas shutoff valve, motor operated with proof of closure switch and plugged leakage test connection. The main gas valve shall be wired to close

automatically in the event of power failure, flame failure, low water or any safety shutdown condition. A lubricating plug cock shall be provided as a means for a tightness check of the primary shutoff valve. An additional plug cock shall be furnished at entrance to gas train. High and low gas pressure switches shall be provided. A second motorized safety shutoff valve with plugged leakage test connection shall be provided. A vent valve shall be located between the safety shutoff valves. Gas pressure regulator shall be provided.

- .2 Burner Turndown - Turndown range shall be minimum 4:1 when firing natural gas.
- .3 CO on Natural Gas is 10 ppm at 50, 75 and 100 % of firing and 25 ppm at 25% firing rate. Excess air is 15% at 50, 75 and 100% of firing and 30% at 25% firing rate.

.5 Controls:

.1 Major system components shall include:

.1 Programmable controller:

- 1. Touch screen HMI
- 2. Modbus communication interface to burner management.
- 3. Various controller input/output modules
- 4. One burner management controller and wiring sub-base.
- 5. One flame scanner: Infrared, Ultra-Violet, or UV Self Check.
- 6. One flame amplifier, to correspond with the selected flame scanner.
- 7. Various temperature and pressure sensors

.2 Major functions that the Boiler Control System shall provide:

- .1 Automatic sequencing of the boiler through standby, pre-purge, pilot flame establishing period, main flame establishing period, run and post purge.
- .2 Flame proving and lockout on flame failure during pilot flame proving, main flame proving, or run.
- .3 Low fire damper/valve position for flame ignition trials.
- .4 Full modulating control of fuel and combustion air.
- .5 Utilize solid state controls and sensors to provide various control functions, such as:
 - 1. Modulating control:
 - 2. Modulating control algorithm shall be Proportional-Integral-Derivative (PID) type.
 - 3. Thermal shock protection based on water temperature and set-point.

4. Various high and low limit alarms and shutdowns.
- .3 Touch screen graphical operator interface and monitoring
 - .1 Manual control of the boiler-firing rate utilizing control screens on the HMI to increment and decrement the firing rate
 - .2 On screen indication of burner management controller status and diagnostics.
 - .3 On screen real-time display of all connected process parameters.
 - .4 On screen display of system alarms and faults.
 - .5 On screen history of alarms and faults.
 - .6 On screen water level indication (optional) and alarm(s).
 - .7 Printing Alarm/Fault history.
- .4 E-mail or paging of boiler alarms (with either Ethernet/IP or modem option).
- .5 Building/plant automation system interface (with Ethernet/IP option).
- .6 Ethernet communications (with Ethernet/IP option).
- .7 Tamper resistant control logic and password protection.
- .8 Night/day setback control.
- .9 Stack flue gas, combustion air (optional), and shell (water) temperatures.
- .10 Boiler efficiency calculation (corrected efficiency with O2 Trim).
- .11 Outdoor reset for hot water boilers.
- .12 Remote modulation or firing rate set-point control.
- .13 Assured low fire cut-off (ALFCO).
- .14 Assured start permissive safety interlocking.
- .15 Variable Speed Drive.
- .6 The Boiler Control System shall provide the following safety provisions for:
 1. Integrated burner management
 - .1 Examine all load terminals to assure it is capable of recognizing the true status of the external controls, limits and interlocks. If any input fails this test, the burner management system should lockout on safety shutdown.
 - .2 Closed-loop logic test verifies integrity of safety critical loads (ignition, pilot, and main fuel valves) and must be able to lockout on safety.
 - .3 Pre-ignition interlocks (fuel valve proof of closure, etc.) and flame signal checked during Standby and Pre-Purge.
 - .4 Dynamic checking of the flame signal amplifier. The control flame signal amplifier must be able to recognize a no flame signal during this dynamic amplifier check.

- .5 Safe start check and expand check to include monitoring flame signal during standby.
 - .6 High and Low fire switches checked for proper sequencing.
 - .7 Tamper-proof purge timing and safety logic.
 2. Integrated boiler controls
 1. Operating and Modulating control
 2. Variable Speed Drive (if used) fault shutdown
 3. Password protection of programmable controller Logic
 4. Password protection of parallel positioning control (if used)
 3. The Boiler Control System shall provide annunciation and diagnostics:
 1. Active alarm annunciation
 2. Provide historical alarm information for on screen display
 3. Detects and isolates an alarm, and reports internal circuit faults
 4. Printer output capable for logging alarms
 5. Capability of printing alarm history of date, time, cycle of occurrence and date and time of acknowledgement up to the most recent 100 faults
 6. English text description of the system fault and troubleshooting procedures
 7. Water level indication and low water shutdown alarm
 8. Dynamic self-checking
 4. The Boiler Control System shall be able to operate in these environmental conditions.
 1. Supply Voltage: 120 VAC (+10%/-15%) 50 or 60 Hz
 2. Maximum total connected load: 1200 VA
 3. Operating temperature limits: 32 to 130°F
 4. 85% RH continuous, non-condensing, humidity
 5. 0.5G continuous vibration
 5. All Boiler Control System wiring shall be in accordance with the National Electrical Codes and local electrical codes.
 6. Boiler Control System component functions shall be as follows:
 1. Burner Management Controller: Provides burner sequencing logic to meet FM/IRI/UL/cUL approval body requirements.
 2. Touch Screen Graphical Interface: Provides user interface to the control system, boiler overview screen with connected boiler parameter readouts, burner management control status screen, alarm banners, diagnostic screens for fault troubleshooting, alarm

history screen, system firing rate screen and system configuration screens.

3. Modbus communication network: provides communication between the programmable controller and burner management system (c/w Variable Speed Drive).
4. Various programmable controller input/output modules: Provides interface for discrete powered and/or isolated relay signals, as well as for analog signals, from and/or to other input/output devices.
5. Stack temperature sensor: measures and transmits a signal to the programmable controller in relation to boiler exit flue gas temperature. It is used for indication and in the calculation of boiler efficiency; it can also be used for high stack temperature alarm and shutdown.
6. Water temperature transmitter (hot water boilers): provides an analog signal to the programmable controller for indication of boiler water temperature; utilized for thermal shock protection, on/off, and modulating control of the burner.
7. Equipment/features:
 1. Lead/Lag Control for multiple boiler systems.
 2. Parallel Positioning hardware (Advanced and Intermediate systems).
 3. Variable Speed Drive for combustion air fan motor (Advanced and Intermediate systems).
 4. O₂ analyzer and/or external O₂ trim system.
 5. Combustion air temperature sensor (Advanced and Intermediate systems): measures and transmits a signal to the programmable controller in relation to the combustion inlet temperature for indication and for use in the calculation of boiler efficiency; also can be used for high combustion air temperature alarm and shutdown, based on set-point.
 6. Economizer flue gas inlet and outlet temperatures, feed water temperature, economizer water in and out temperature (no thermocouple inputs with Base system)
 7. Water level & fuel monitoring.
 8.
 - a. The two Boilers shall be equipped with low water cut offs c/w test and check valves and auxiliary low water cut-offs c/w separate connections to the Boilers.
 - b. Note: the Boilers specified are Cleaver Brooks model CBEX 200-100-30HW minimum 2 pass firetube boiler with enhanced tube design to promote turbulent flow and increased heat transfer.
Efficiency verification testing will be based on the stack loss method, which will be conducted at the

time of Boiler start-up. Measurements will be taken for stack temperature, ambient air temperature and excess air, to determine efficiency.

- b. Alternate Boiler manufacturers shall provide a list of projects (min.3) installed in Atlantic Canada c/w references (names and phone numbers) for evaluation during the Tender period.

- .9 Email and paging (text messaging) via Ethernet.
- 10. Paging via phone line (requires modem).
- 11. Building automation interface.
- 12. Remote monitoring.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install in accordance with ANSI/ASME Boiler and Pressure Vessels Code Section IV, regulations of the Province of New Brunswick, Authority Having Jurisdiction, except where specified otherwise, and the Manufacturer's recommendations.
- .2 Piping connections: to inlets and outlets as recommended by Boiler Manufacturer.
- .3 Maintain clearances as indicated or if not indicated, as recommended by manufacturer for operation, servicing and maintenance without disruption of operation of any other equipment/system.
- .4 Mount unit level.
- .5 Pipe hot water relief valves full size to nearest funnel floor drain.
- .6 Natural gas-fired installations - in accordance with CAN/CSA-B149.1.
- .7 Pressure test the boiler prior to final hook-up, as per the manufacturer's recommendations.
- .8 Drill flue collar for stack thermometer installation.

3.3 MOUNTINGS AND ACCESSORIES

- .1 Safety valves and relief valves:

- .1 Run separate discharge from each valve.
- .2 Terminate discharge pipe as indicated on-site.
- .3 Run drain pipe from each valve outlet and drip pan elbow to above nearest drain.

3.4 FIELD QUALITY CONTROL

- .1 Commissioning:
 - .1 Manufacturer to:
 - .1 Certify installation.
 - .2 Start-up and commission installation.
 - .3 Carry out on-site performance verification tests, including combustion efficiency tests.
 - .2 Demonstrate operation and maintenance.
 - .3 Provide Departmental Representative and Consultant at least 48 hours notice prior to inspections, tests, and demonstrations. Submit written report of inspections and test results.

3.5 CLEANING

- .1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION