



RETURN BIDS TO:

RETOURNER LES SOUMISSIONS À:

Travaux publics et Services gouvernementaux
Canada

Place Bonaventure, portail Sud-Est

800, rue de La Gauchetière Ouest

7^{ième} étage

Montréal

Québec

H5A 1L6

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

Travaux publics et Services gouvernementaux Canada

Place Bonaventure, portail Sud-Est

800, rue de La Gauchetière Ouest

7^{ième} étage

Montréal

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H5A 1L6

Title - Sujet Reno.chauffage refroid. Lennoxville	
Solicitation No. - N° de l'invitation EF944-170110/A	Amendment No. - N° modif. 002
Client Reference No. - N° de référence du client R.078727.001	Date 2016-06-10
GETS Reference No. - N° de référence de SEAG PW-\$MTC-255-13864	
File No. - N° de dossier MTC-6-39029 (255)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2016-06-30	Time Zone Fuseau horaire Heure Avancée de l'Est HAE
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Desforges, Julie	Buyer Id - Id de l'acheteur mtc255
Telephone No. - N° de téléphone (514) 496-3413 ()	FAX No. - N° de FAX (514) 496-3822
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
EF944-170110/A

Amd. No. - N° de la modif.
002

Buyer ID - Id de l'acheteur
mtc255

Client Ref. No. - N° de réf. du client
R.078727.001

File No. - N° du dossier
MTC-6-39029

CCC No./N° CCC - FMS No./N° VME

THE INVITATION TO TENDER IS MODIFIED AS MENTIONED BELOW:

Addendum 2

Please find enclosed herewith the above-mentioned addendum which forms part of the tender documents.

The closing date for the above mentioned project has been postponed until June 30, 2016 2:00 PM.

The previous drawings are replaced partially by the drawings included in this amendment.

Equivalent products:

A recall is made to the effect that the approval of alternative materials must be carried out following the general instructions IG15 clause R2710T (2016-04-04).

Annex 1 Request for progress payment, phase 1 added.

All other terms, clauses and conditions remain unchanged.



REQUEST FOR PROGRESS PAYMENT DEMANDE DE PAIEMENT PROGRESSIF

Contractor (Name and Address) - Entrepreneur (nom et adresse) LES CONTRÔLES A.C. INC. 2185, 5IÈME RUE LÉVIS (QC) G6W 5M663881,35	Page 1 of 1
	Request No. - N° de la demande EF944-161961
	From - Du 2016-05-01 To - À 2016-06-20
	Contract No. - N° de contrat EF944-161961/001/MTC
Description and Location of Work - Description et endroit des travaux RÉNOV. MAJEURES - RÉSEAUX HYDROLIQUES - CDRS 2800 RUE COLLÈGE, SHERBROOKE (QC) J1M 0C8	Project No. - N° de projet R.078727.001

NOTE: All amounts are to be entered without taxes.

NOTA : Tous les montants doivent être entrés sans les taxes.

PROGRESS CLAIM - CONTRACTOR RÉCLAMATION PROGRESSIVE - ENTREPRENEUR	This Period Présente période	Total to Date Total à ce jour
Contract Amount Claimed Montant du contrat réclamé	\$ 42,606.12	\$ 283,085.02
Percentage Rate Taux de pourcentage .14975	Applicable taxes Taxes applicables \$ 6,380.27	\$ 42,391.98
TOTALS TOTAUX	\$ 48,986.39	\$ 325,477.00
This claim is submitted in accordance with the Terms of Payment of the above contract for work completed and material delivered to the site but not incorporated into the work, the whole as described in the attached "Cost Breakdown". Contractor's Authorized Signing Officer - Entrepreneur - Signataire autorisé		
La présente réclamation est présentée conformément aux modalités de paiement du contrat ci-dessus à l'égard des travaux achevés et des matériaux livrés à l'emplacement mais non incorporés à l'ouvrage, le tout tel que décrit à la ventilation des coûts annexée. Title - Titre <u>ING</u> Date <u>24/05/16</u>		

PROGRESS REPORT - PWGSC RAPPORT PROGRESSIF - TPSGC	Total Amount Montant total	(Less) Holdback (Moins) Retenue	Net Amount Montant net
TOTALS TO DATE TOTAUX À CE JOUR	\$ 283,085.02	\$ 14,154.25	\$ 268,930.77
Contract initial \$ 443,775.00		Less Previous Payments Moins paiement(s) antérieur(s)	\$ 228,454.96
mod 1 \$ 34,659.08		Contract Amount Payable Montant de contrat payable	\$ 40,475.81
mod 2 \$ 18,078.44		Applicable taxes Taxes applicables	\$ 6061.25
total 496,512.52		TOTAL	\$ 46,537.07

I hereby certify that the work done and material delivered to site up to the date of this request for payment are as listed on the attached cost breakdown. Work and material are according to plans, specifications and contract, that the prices are according to contract or, if not specified by contract, are reasonable.

Je certifie par les présentes que les travaux effectués et les matériaux livrés à l'emplacement jusqu'au jour de cette demande de paiement sont tels qu'ils sont énumérés dans la ventilation des coûts ci-jointe. Les travaux et les matériaux sont conformes aux plans, au devis et au contrat et les prix sont conformes au contrat ou, s'ils ne sont pas spécifiés au contrat, ils sont raisonnables.

Consultant - Expert-conseil		Date	
The value of the portion of the work completed and material delivered to site, described in the above Progress Claim, is as shown in the Progress Report. Certified pursuant to Section 34 of the Financial Administration Act.		La valeur de la partie achevée des travaux et des matériaux livrés à l'emplacement, figurant à la réclamation progressive ci-dessus, est telle qu'elle figure au rapport progressif. Certifié en vertu de l'article 34 de la Loi sur la gestion des finances publiques.	
<u>Jonathan Giguère</u>		<u>2016-06-09</u>	
Departmental Representative - Représentant ministériel		Date	

NOTE: Complete the following part for contracts subject to a Unit Price Arrangement once the portion of the Work subject to a Unit Price Arrangement is complete.

NOTA : Compléter la partie suivante pour les contrats assujettis à une entente à prix unitaire, une fois que la partie des travaux assujettie à une telle entente est complétée.

FINAL CERTIFICATE OF MEASUREMENT - CERTIFICAT DÉFINITIF DE MESURAGE

The quantities shown on the attached cost breakdown are the final measurement of this contract.

Les quantités indiquées à la ventilation des coûts ci-jointe constitue le mesurage définitif pour ce contrat.

Consultant Expert-conseil	Date	Departmental Representative Représentant ministériel	Date
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ADDENDUM NO. M-1

Project: Sherbrooke Research and Development
Center – Major renovation of the hydraulic
heating and cooling network
Phase 2 - Generality and mechanical sections
PWGSC : R.078727.001

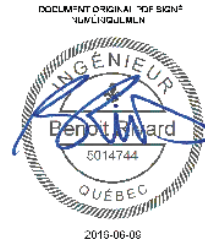
Description: Addition and clarification of work

Project no.: 2012-186-103-1

Division: 01 - General Instruction and 23 - Mechanical

By: Benoit Rivard, eng.

Date: 2016-06-07



1. This addendum shall be part of original drawings and specifications and shall form part of the contractual documents. Bidders shall make sure that the cost of this addendum is included in the bid amount.

2. Documents:

- 2.1 Included documents:

- 2.1.1 Specifications:

- Section 01 11 01, pages 3 and 19.
- Section 01 52 00, entire section issued.
- Section 23 05 00, entire section issued.
- Section 23 05 93, entire section issued.
- Section 23 07 15, page 6.
- Section 23 21 14, pages 3 and 3a.
- Section 23 25 00, pages 3, 4 and 4a.
- Section 23 33 00, pages 3 and 3a.
- Section 23 73 12, page 3.

- 2.1.2 Drawings nos.:

- M-1 – Legend and drawing list.
- M-7 – Hydraulic diagram – Heating / Cooling – New.
- M-9 – Heating/Cooling (domestic water and gas) – Level A.
- M-10 – Heating/Cooling – Level A.
- M-13 – Heating/Cooling – Temporary work - Level C.
- M-14 – Heating/Cooling – Demolition - Level C.
- M-15 – Heating/Cooling – New - Level C.
- M-18A – Ventilation – Level A.
- M-19 – Ventilation – Demolition - Level C.
- M-20 – Ventilation – New - Level C.



3. Description of work:

- 3.1 Added precision in regards to "General Instructions".
- 3.2 Clarification and upgraded scope of work in the "Cooling and Heating" mandate.
- 3.3 Clarification and upgraded scope of work in the "Ventilation" mandate.
- 3.4 Clarification in regards to the air balancing requirements.
- 3.5 Clarification in regard to some piping insulation.
- 3.6 Addition of the specification of the buffer tank no RES-1.
- 3.7 Addition of one chemical treatment for the cooling tower no T-1.
- 3.8 Addition of drawing M-18A in regards to minor ventilation work.
- 3.9 Adjustment of the inlet and outlet air values for the preheating coil.

- .3 Specialties mentioned in the titles of the drawings are to facilitate the work of each section and should not be regarded as restrictive.
- .4 Drawings indicate the approximate placements of equipment. Each section must check the exact emplacements before any installation.
- .5 During bids, each section must study the mechanical and electrical drawings and specifications and compare them with architectural and structural drawings and specifications and notify the architect or engineer at least five working days before submission of his tender of any contradictions, errors or omissions that can be observed.
- .6 During the execution of the works, notify the architect or engineer of any inconsistency, error or omission discovered before starting the work.
- .7 The engineer reserves the right to interpret the contents of mechanical and electrical drawings and specifications.
- .8 No indemnity or compensation will be given for the displacement of ducts, pipes, etc., deemed necessary because of the architecture, the structure or any other normal consideration.

1.5 IMPORTANT NOTE: PROVIDE AND INSTALL

- .1 Provide and install all materials and equipment described in this specification and/or shown in the drawings, regardless if the expression "provide and install" is used or not. See also the article "MINOR WORKS".

1.6 LAWS, REGULATIONS AND PERMITS

- .1 All laws and regulations issued by the authorities having jurisdiction relating to the works described herein apply. Each section is required to comply with them without additional compensation.
- .2 Each section must obtain, at its expense, all necessary permits and certificates, pay all costs for drawing approvals and for inspections required by organisms having jurisdiction.
- .3 Provide a copy of the drawings bearing the seal of approval of the relevant inspection services.
- .4 Upon completion of the works, provide the owner with a copy of all the permits and approval certificates from the different offices and departments that have jurisdiction over this building. Submit a copy of the transmittal to the Departmental Representative.

1.7 MINOR WORKS

- .1 Every section must provide all required components and must do all of the minor works that are necessary for the equipment or system to work properly, even if not specified in the specifications guide.

- ① .2 General contractor is responsible for the displacement and replacement of all furniture required for the installation of the control valve by Division 23. See Phase 1 "CONTROL" documents and section 23 05 00, Heating and chilled water scope of work.

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- .1 The following services are not to be interrupted without prior agreement with the owner: telephone, electricity, lighting, intercom, fire alarms, sprinklers, fire protection water, domestic water, sanitary plumbing, storm drainage, external drainage systems, ventilation and air conditioning, etc.
 - .2 To ensure the continuity of services at during the hours required by the owner, each relevant section must do all temporary works required, including labor and equipment.
 - .3 All major service cuts must be performed outside the occupancy hours of the building. For example: ventilation, heating-cooling, electricity, water, steam, etc.
 - .4 Contractor must advise the Owner at least seven days in advance for any electrical shutdown.
- .2 Demolition:
- .1 All demolition work is the responsibility of each concerned section.
- .3 Occupied rooms:
- .1 The work is being done during the occupancy of rooms in the building, therefore, the work must be performed by stages in the rooms designated by the owner.
 - .2 Perform work after prior agreement with the owner and establish an acceptable work schedule with the owner.
 - .3 Before undertaking work in a given area, ensure the availability of all equipment, tools, and labor required to perform the work without interruption.
 - .4 Follow the owner's instructions as to the delivery to the worksite of its personnel and equipment.
 - .5 The owner will indicate which staircase can be used and within what limits it is permitted to circulate in the present corridors.
 - .6 Take all necessary precautions to adequately protect existing installations in these areas.
 - .7 At no time must the traffic and the functioning of the building services be impeded. Follow all of the owner's instructions.
- .4 Noise:
- .1 Because of the proximity of the occupied premises, take all necessary measures to reduce the noise from construction and demolition.
 - .2 It is important to take in consideration that any loud work or any type of work that may bother the personnel must be executed outside of the opening hours of the RDCS, with the Owner and Departmental Representative approbation.
- .5 Other restrictions:
- .1 In order not to impair the function of the building that must remain in operation during construction:
 - .1 No vehicles other than trucks used to transport equipment has access to the site for the duration of the works.
 - .2 The use of all elevators will be allowed as long as all the Owners requirements are respected.
 - .3 The interior circulation outside the boundaries of the services to be renovated must be minimized.
 - .4 The access permitted to the various rooms, for demolition and construction purposes, must be determined by the owner.

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 All contract documents apply to Divisions 01, 02, 23, 26 and also Architecture, Civil work and Structure.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International):
 - .1 CSA-A23.1/A23.2 (current edition), Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-S269.2 (current edition), Access Scaffolding for Construction Purposes.
 - .3 CAN/CSA-Z321 (current edition), Signs and Symbols for the Occupational Environment.
- .2 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.
- .3 U.S. Environmental Protection Agency (EPA) / Office of Water:
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.4 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms & temporary stairs.

1.5 ELEVATORS

- .1 Designated existing elevators can be used by construction personnel and for the transporting of materials. Co-ordinate use with Departmental Representative.
- .2 Provide protective coverings for finish surfaces of cars and entrances.

1.6 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.7 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt the building daily operations.
- .2 Provide and maintain adequate access to project site.

1.8 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

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1.9 CONSTRUCTION TRAILER

- .1 Provide construction trailer heated to 22°C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own construction trailer as necessary. Direct location of these trailer.
- .4 Building manager will supply a 208/3/60, 30 A, power feed including the electrical cable up to the trailer. Contractor must plan the electrical connection and all required accessories to connect the trailer.

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.11 SANITARY FACILITIES

- .1 Contractor and employees are allowed to use the building sanitary facilities. At all time, employees must respect building hygiene and cleanliness rules.
- .2 If the hygiene or cleanliness rules are not followed, the Departmental Representative reserves the right to cancel the use of the sanitary facility of the building. From then on, the Contractor shall supply, in sufficient number, outdoor sanitary facility at his own expense.

1.12 CONSTRUCTION SIGNAGE

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of offsite on completion of project or earlier if directed by Departmental Representative.

1.13 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

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1.14 SURFACE REPARATION

- .1 Contractor must plan the repair of all damaged surfaces following the installation of his equipment (indoor and outdoor), construction trailer, lockable shed, garbage container, etc. Repair surfaces as the actual state prior to the work and at the Owner satisfaction.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

① Addendum no. M-1, entire section issued on June 7, 2016

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Sections 01.

1.2 PROJECT PHASING - ELECTROMECHANICAL

- .1 Keeping in mind the realisation period for the project, it is of the primary importance that the Contractor follows a strict schedule in order to respect the allowed realisation period. The following milestone (non-exhaustive list) can be optimized or modified upon preliminary agreement with the Departmental Representative.
- .2 Any delay in the project realisation upon realisation period will be of the Contractor’s responsibility who will, at his own cost, do all necessary work/action to avoid any prejudice to the Owner. This will include the temporary leasing of appropriate equipment to assure thermal comfort inside the building, no matter the season, and all workmanship and material necessary to the temporary work.
- .3 Phase 2.1: Summer 2016 (May 2016 to September 2016)
 - .1 The completion of all the work in the heating network:
 - .1 Dismantling of all heating equipment as shown on plans.
 - .2 Installation of the new boilers (water and steam).
 - .3 Installation of the preheating coil.
 - .4 Installation of pumps and heat exchangers in regards to heating work.
 - .5 Installation of chemical treatment.
 - .2 Replacement of energy recovery wheel.
 - .3 Architecture work necessary to the phase 2.1 work.
 - .4 Structure installation on the roof for the air cooled condenser (by structure).
 - .5 Structural reinforcement (by structure).
 - .6 Dismantling of the underground tanks (by civil).
 - .7 Temporary modifications of the discharge piping of the PB-1 pump in order to assure appropriate operation of the existing chillers (REF-1 and REF-2) with the existing cooling towers (T-2 and T-3). This will free the NPS 5 existing piping necessary in the new heating network.
 - .8 Test, startup, commissioning, cleaning, etc.
 - .9 Phase 2.2 (autumn 2016-winter 2017) preliminary work.
 - .10 Any other work that doesn’t cause prejudice to the building operation and project schedule.
- .4 Phase 2.2: Autumn 2016 – Winter 2017 (October 2016 to March 2017)
 - .1 The completion of all the work in the cooling network, in phase:
 - .1 Dismantling of all cooling equipment as per indications on plans, while respecting the temporary work schedule in order to assure proper working of all equipment.

- .2 In order to assure proper operation of the heat pumps, U-3 and U-4 cooling coils and building fan-coils, provide for temporary piping to condensing unit CU-3 and CU-4 with the cooling tower T-1. Plan the rental of an inline pump for the cold glycol supply to all equipment. Proceed with piping modifications as shown on the drawing (temporary work). Provide balancing valves.
 - .1 Pump of 3.8 l/s, 50' of head, 1750 rpm, 2 HP, 600/3/60.
- .3 Installation of the chillers.
- .4 Installation of the air cooled condensers.
- .5 Installation of pumps and heat exchangers in regards to cooling work.
- .6 Installation of chemical treatment.
- .7 Following the completion of the installation of the main equipment (item no 3 to 6), proceed with the transfer of the equipment supplied by condensing units (CU-3 and CU-4) toward the REF-3 chiller and cooling tower T-4. Proceed with the dismantling of the temporary work and complete the installation of every equipment.
- .2 Architecture work necessary to the phase 2.1 work.
- .3 Test, start-up, commissioning, cleaning, etc.

1.3 SPECIFIC CONDITIONS – HEATING – CHILLED WATER

- .1 The specific requirements of the mechanical and electrical works, Divisions 01 and 23, apply to this section.
- .2 The following sections are included in the scope of the heating – chilled water work and complement each other to form a whole.
 - .1 23 05 00 – Common Work Results for HVAC.
 - .2 23 05 05 – Installation of Pipework.
 - .3 23 05 16 – Expansion fittings and loop for HVAC piping.
 - .4 23 05 17 – Pipe Welding.
 - .5 23 05 19.01 – Thermometers and Pressure Gauges - Piping Systems.
 - .6 23 05 23.02 – Valves – Cast iron.
 - .7 23 05 23.05 – Butterfly valves.
 - .8 23 05 29 – Hangers and Supports for HVAC Piping and Equipment.
 - .9 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment
 - .10 23 05 53.01 – Mechanical Identification.
 - .11 23 05 93 – Testing, Adjusting and Balancing for HVAC.
 - .12 23 07 14 – Thermal Insulation for Equipment.
 - .13 23 07 15 – Thermal Insulation for Piping.
 - .14 23 08 01 – Performance verification mechanical piping system
 - .15 23 08 02 – Cleaning and start-up of mechanical piping system
 - .16 23 11 16 – Domestic water piping
 - .17 23 11 23 – Facility Natural Gas Piping.

- .18 23 21 13.02 – Hydronic systems : Steel.
- .19 23 21 14 – Hydronic Specialties.
- .20 23 21 23 – Hydronic Pumps.
- .21 23 22 13 – Steam and Condensate Heating Piping.
- .22 23 22 14 – Steam Specialties.
- ① .23 Cancelled.
- .24 23 25 00 – HVAC Water Treatment Systems.
- .25 23 52 00 – Heating Boilers
- .26 23 57 00 – Heat Exchangers for HVAC
- .27 23 64 26 – Water Chillers.
- .28 23 65 10 – Cooling Towers.
- ① .29 Cancelled.
- ① .30 23 51 00 – Breeching, Chimneys and Stacks
- .3 Heating and chilled water – Scope of the work:
 - .1 Included work:
 - .1 The work includes, in general, the labor, the delivery, and the installation of all materials and equipment necessary for the heating – chilled water work indicated on the drawings and specifications.
 - .2 This work includes, but is not limited to:
 - ① .1 All demolition shown on the drawings and necessary for the completion of the project, including pot-feeders, accessories of the dismantled pumps, chemical treatment for the four cooling towers, etc.
 - .2 All new domestic water piping (hot and cold) for existing and new equipment.
 - .3 The backflow preventers on the domestic cold water pipe supplying the soft water system.
 - .4 All new gas piping for the new equipment.
 - .5 The complete chilled water system with forced supply and return circulation.
 - .6 The complete hot water system with forced supply and return circulation.
 - .7 The complete close circuit cooling tower water system with forced supply and return circulation.
 - .8 All temporary work required for proper equipment operation, including test, balancing and insulation.
 - .9 The supply and installation of all required pumps, on concrete foundation.

- .10 The supply and installation of the water chillers REF-1 and REF-2 with air-cooled condensers, chillers installed on new concrete foundation in mechanical room, condenser installed on the steel structure on the roof, under the supervision of the chillers' manufacturer, ready to be assembled, connected, and turned on.
- .11 The supply and installation of the water chillers REF-3, with heat recovery, chillers installed on new concrete foundation in mechanical room, under the supervision of the chillers' manufacturer, ready to be assembled, connected, and turned on.
- .12 The supply and network filling of all necessary refrigerant for the proper operation of the chillers REF-1, REF-2 and REF-3.
- .13 The supply and installation of hot water boilers CEC-1, CEC-2 and CEC-3, installed on modified concrete foundation in boiler room, under the supervision of the chillers' manufacturer, ready to be assembled, connected, and turned on.
- .14 The supply and installation of a steam boiler CVAP-1, installed on new concrete foundation in mechanical room, under the supervision of the chillers' manufacturer, ready to be assembled, connected, and turned on.
- .15 The complete hot propylene glycol force flow heating system, supply and return with hot water – glycol exchanger for the preheating coil of the ventilation unit U-2.
- .16 The supply and installation of a close circuit cooling tower no T-4, installed on structural support in mechanical room, under the supervision of the chillers' manufacturer, ready to be assembled, connected, and turned on.
- .17 The supply and installation of the heat exchangers, installed on new concrete foundations in mechanical room, ready to be assembled, connected, and turned on.
- .18 Cancelled.
- .19 The complete chemical treatment system for the following systems: chilled water, hot water, steam and cooling towers.
- .20 The complete glycol pressurisation systems for the chilled water, hot water and cooling tower network.
- .21 The complete make-up water system for the chilled water, hot water and cooling towers water networks.
- .22 The steam network for the humidifiers, including all required accessories.
- .23 The pressure reducing stations on the steam system with safety valves and vents to the outside to supply the low pressure steam systems.
- .24 The low pressure steam systems with gravity condensate systems and low pressure supply for the steam heating coils, the humidifiers, and the other devices indicated in the drawings.

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- .25 All special connections described in the specification and/or shown in the drawings.
- .26 Provide the capping of the underground piping following the excavation and dismantling by Civil. Piping must be capped inside of the boiler room and outside the building. Provide welded cap or combination flange-blank flange.
- .27 The supply, the storage, and the installation of springs, anti-vibration mounting pads, flexible hoses, and other noise dampening devices required for devices and systems supplied by heating – chilled water.
- .28 The supports and structural steel components required to support the pipework, the fittings, and the equipment.
- .29 The supply in sufficient quantity of all required propylene glycol necessary for the filling of all network.
- .30 Tests, start-up and commissioning.
- .31 Even with the commissioning planned on the chillers REF-1, REF-2 and REF-3 at the end of winter 2017, plan for a second commissioning on each chiller during the peak summer period, in order to validate proper operation. Plan for sufficient time to proceed with every verification as requested in sections 01.
- .32 All special connections.
- .33 Sealing of sleeves and openings.
- .34 The coordination of erection drawings from sections from the Divisions 23, 25, and 26, in accordance with the requirements of the Division 01 - General Instructions.
- .35 The insulation as described in sections 23 07 14 – Thermal Insulation for Equipment and 23 07 15 – Thermal Insulation for Piping.
- .36 The complete identification of all devices and accessories, in accordance with section 23 05 53.01 Mechanical Identification.
- .37 The seismic measures concerning heating – chilled water work, in accordance with Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.
- .38 Balancing of all control valve to obtain required flow at every equipment.
- .3 Instrumentation openings:
 - .1 In the pipes and/or ducts, create the openings necessary for measuring instruments and temperature, pressure, flow, etc. control instruments, where required by the Division 25.
 - .2 Install wells in the piping for the thermometers and the temperature readings.
 - .3 Install access doors to the ventilation controls.

①

- .2 Work excluded:
 - .1 In general, the following work is excluded:
 - .1 Control work, except those specifically requested in this section.
 - .2 The electrical connections, except those specifically requested in this section.
 - .3 Flashing.
 - .4 The steel framework supporting the cooling towers.

- .4 Special Connection:
 - .1 In general, special connections include all required connections to devices, all piping, adapters, shut-off valves, bypasses, unions, flanges, screens, air vents, controls, test valves, drain valves, control valves, shock absorbers, buffer tanks, traps, ventilation ducts, flexible joints, and other accessories necessary to operate the devices.
 - .2 When special connections are made by others for their devices, each relevant section should be monitoring these connections and is solely responsible for the proper functioning of its equipment.
 - .3 Each section is responsible for any damage it may cause the devices to which it makes connections.
 - .4 Part of the heating – chilled water work:
 - .1 All connections and all chilled water, hot water, cooling tower water, propylene glycol, and steam connection points for various devices shown in the drawings, as well as those described in the specifications.
 - .2 Controls:
 - .1 The installation and the connections of the piping for chilled water, ethylene glycol, hot water, heating water, tower cooling water and steam, and all control valves are provided by the Division 25.
 - .2 Install the control valves following the guidelines of the Division 25 and under their supervision.
 - .1 Notwithstanding all control valve shown in the hydraulic schematic, plan the installation of the following valves, supplied by COMMAND (phase 1) and shown on their documents:
 - .1 Sixty-eight valves DN ½.
 - .2 Five valves DN ¾.
 - .3 Twelve valves DN 1.
 - .4 One valve DN 1½.
 - .2 General contractor is responsible for the displacement and replacement of all furniture required for the installation of the control valve by Division 23, see section 01 11 01, item 1.7.
 - .3 Obtain the necessary directives.

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- .4 The diameters of the control valves shown on the drawings are for reference only.
- .5 When the control valves or other accessories are supplied by this section, but installed by others, this section remains directly responsible for the operation of its equipment.
- .6 Provide the directives and the supervision required for the installation.
- .3 Ventilation:
 - .1 All steam coil connections for steam, condensate, and steam vents.
 - .2 All steam humidifier connections for steam and condensate, including the piping and the accessories needed for the complete assembly of the various humidifier components.
 - .3 All ethylene glycol connections to the ventilation coils.
 - .4 All hot water heating coil connections to the hot water.
 - .5 All ventilation coil chilled water connections.
- .4 Plumbing – Drainage:
 - .1 All connections for drainage, overflow, safety valve exhaust, etc. from all heating and refrigeration devices to the funnels.
 - .2 These connections include, without being limited to, those from the cooling towers, the water chillers, the fan-coil units, the water softeners, the condensate pans, the hot water heating networks, the chilled water, the water towers, the steam and condensate, the backflow devices, etc.
 - .3 Anchor the connections near the funnels.
 - .4 Bevel to 45° and ream the end of the pipes flowing into the funnel.
 - .5 Install the drain piping with the highest flow above the center of the funnel.
 - .6 Determine the dimensions of the funnels according to the number and size of the indirect drains discharging into it.
 - .7 The actual funnels are part of the plumbing work, as well as any piping from the funnels to the sanitary or storm drainage systems.
 - .8 The drainage piping from the backflow devices' funnels to the drainage funnels are part of this section's work.
- .5 Plumbing – Domestic Cold Water:
 - .1 Supply and install all domestic cold water connections to the various heating and refrigeration devices. For this purpose, a shut-off valve is installed by this section at each connection point to the domestic cold water network.

- .6 Future connections – Steam, condensate, chilled water, and hot water:
 - .1 In the places shown in the drawings, provide connections with welded caps for future use on the high pressure steam piping, the low pressure steam piping, the condensate piping, the chilled water supply and return piping, and the hot water supply and return piping. View the details on the drawings.
- .7 Cleaning and degreasing of the hot water heating systems, the high temperature hot water, the chilled water, and the cooling tower water and ethylene glycol:
 - .1 In addition to the drains provided on different devices, provide NPS 1½ connectors with extra heavy cast iron screw caps (to allow connection of a drain hose) at the low points and all places where the pipe cannot be drained by gravity on hot water heating, chilled water, ethylene glycol, and tower water systems.
 - .2 If a check valve prevents the drainage, install an NPS 1½ connector on the side where drainage is otherwise impossible.
- .5 Documents to provide:
 - .1 Provide the following documents:
 - .1 The manufacturers' warranty certificates.
 - .2 The pressure vessel certificates.
 - .3 The certificates of approval from the concerned authorities.
 - .4 The instruction manuals for the operation and the maintenance of the equipment, in accordance with Division 20.
 - .5 The drawings kept up to date, in accordance with Division 20.
 - .6 Erection (coordination) drawings, in accordance with Division 20.
 - .7 A list of legends with piping identification, in accordance with Division 20.
 - .8 A piping identification list.
 - .9 A list indicating for each electric motor: the voltage, the current inscribed in amperes on the motor's plate, the motor service factor, the type of lubrication, the current at no load, at zero speed, and at normal load on each of the motor's phases, the normal operating voltage on each phase, the capacity of the thermal protection installed in the starter, and the adjustment of the thermal protection.
 - .10 A list indicating for each pump: the following pressures measured with calibrated pressure gauges at the pump inlets and outlets, for normal flow and no flow.
 - .11 List of the automatic flow rate controllers' flows.
 - .12 List of the flow meters' flows.

1.4 SPECIFIC CONDITIONS – VENTILATION

- .1 The specific requirements of the mechanical and electrical works, Divisions 01 and 23, apply to this section.

.2 The following sections are included in the scope of the ventilation work and complement each other to form a whole.

- .1 23 05 00 – Common Work Results for HVAC.
- .2 23 05 29 – Hangers and Supports for HVAC Piping and Equipment
- .3 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.
- .4 23 05 53.01 – Mechanical Identification
- .5 23 05 93 – Testing, Adjusting and Balancing for HVAC
- .6 23 05 94 – Pressure testing of air duct system
- .7 23 07 13 – Duct Insulation
- .8 23 23 00 – Refrigerant Piping.
- .9 23 31 13.01 – Metal Ducts - Low Pressure to 500 Pa
- .10 23 33 00 – Air Duct Accessories.
- .11 Cancelled.
- .12 23 73 12 – Coils.
- .13 23 84 13 – Humidifiers.

.3 Scope of work:

.1 Work included:

- .1 The work includes, in general, labor, supply, and installation of all materials and equipment necessary for ventilation – air conditioning work indicated on the drawings and in the specification.
- .2 This work includes, but is not limited to:
 - .1 All demolition shown on the drawings and necessary for the completion of the project.
 - .2 The supply and installation of a propylene glycol preheating coil in the ventilation unit U-2.
 - .3 The complete replacement of the energy recovery wheel in the ventilation unit no URC-1. The supply and installation of a new energy recovery wheel, including the on-site support from the manufacturer for the measurement survey prior to the order, and the on-site support from the manufacturer for the installation of the new equipment by the contractor.
 - .4 The supply and installation of all new humidifier, complete with accessories.
 - .5 The supply and installation of all new chimney for the boilers exhaust. Provide fire proof sealant between the combined chimney and the existing floor openings.
 - .6 The insulation as described in sections 23 07 13 – Duct Insulation.
 - .7 All special connections and ducts.
 - .8 All supports and structural steel components required to support the ducts and the equipment.
 - .9 All access doors.

- ①
 - .10 The supply and the installation of springs, anti-vibration bases, acoustic plenums, silencers, and other equipment required for this section.
 - .11 The vandal-proof grates at the locations shown in the drawings.
 - .12 All demolition, relocation, and recalibration work for ducts, terminal units, and diffuser grilles, as shown in the drawings.
 - .13 Identification of the systems' ventilation ducts, the devices, and the other accessories, in accordance with section 23 05 53.01 - Mechanical Identification.
 - .14 Tests, start-up and commissioning.
 - .15 All work for the balancing and the adjustments of the air quantities.
 - .16 Paraseismic measures for ventilation – air conditioning work, according to section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
 - ①
 - .17 The motor replacement of the ventilation units no U-1A, U-1R and U-2A, including the furniture of the belts and pulleys with variable pitch.
 - ①
 - .18 The dismantling of the inlets vanes of the fans no U-1A, U-1R and U-2A, including all accessories.
 - .2 Work excluded:
 - .1 In general, the following work is excluded:
 - .1 The controls: the supply and the installation.
 - .4 Special connections and related work:
 - .1 See Divisions 01 and 23.
 - .2 Part of this section's work:
 - .1 The complete ventilation connections of the various devices indicated on the drawings and/or specifications, whether these devices are part of this section or not. The dimensions of the ventilation ducts to the devices shown in the drawings are approximate and should be verified with the other involved sections before the pipes are manufactured.
 - .2 The directives, the supervision, and the responsibility for the installation of the various devices provided by this section, but installed by another section.
 - .3 The welded or screwed connections for the ventilation devices and ducts prepared to receive the drain pipes.
 - .4 The openings and the access doors required for the control devices and the other instruments. The sealing of the pipes passing through the ventilation units.
 - .5 Documents to provide
 - .1 Provide the following documents:
 - .1 The certificates of approval from the concerned authorities.

- .2 Shop drawings, device drawings, and erection drawings.
- .3 A list of duct identification legends.
- .4 Copies of the instruction manuals for the equipment operation and maintenance.
- .5 The drawings, kept up to date.
- .6 A list indicating for each electric motor: the current in amperes at zero load and at normal load, the capacity of the heater installed in the starter, and the value of the maximum current in amperes inscribed on the motor plate.
- .7 A full report of the results requested in the article "VENTILATION SYSTEMS' TAB REPORT" from the section 23 05 93 - Testing, Adjusting and Balancing for HVAC

1.5 ELECTRICAL CONNECTIONS

- .1 Each relevant mechanical section must provide and install the motors, the thermostats, the controllers, and the other devices specific to their own specialty shown on the drawings and/or requested in the specification.
- .2 Unless otherwise indicated, each relevant mechanical section must provide the starters and the transformers relating to their specialty. These starters and transformers are installed and connected by the Division 26.
- .3 According to the indications on the diagrams and the drawings, the Division 25 or 26 must provide and install the ducts, the cables, and the boxes with complete connections for all mechanical devices, under the supervision of the Division that provided the device.
- .4 However, each relevant mechanical section is solely responsible for the operation of their own equipment. They must check all the electrical control sequences and the protection of each device by checking all the overload relays.
- .5 Each relevant mechanical section is solely responsible for the selection of the overload relays.
- .6 All electrical connections must comply with the electrical specification requirements.

Part 2 Product

2.1 NOT APPLICABLE

- .1 Not applicable.

Part 3 Execution

3.1 NOT APPLICABLE

- .1 Not applicable.

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01.

1.2 SUMMARY

- .1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- .2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.3 QUALIFICATIONS OF TAB PERSONNEL

- .1 Submit names of personnel to perform TAB to Departmental Representative within 30 days prior of TBA startup.
- .2 Provide documentation confirming qualifications, successful experience.
- .3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
 - .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2002.
 - .2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.
 - .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.
- .4 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- .8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
 - .1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
 - .2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.4 PURPOSE OF TAB

- .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads
- .2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.5 EXCEPTIONS

- .1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.6 CO-ORDINATION

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.7 PRE-TAB REVIEW

- .1 Review contract documents before project construction is started and confirm in writing to Departmental Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
- .2 Review specified standards and report to Departmental Representative in writing proposed procedures which vary from standard.
- .3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.8 START-UP

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in Division 23.

1.9 OPERATION OF SYSTEMS DURING TAB

- .1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.

1.10 START OF TAB

- .1 Notify Departmental Representative 7 days prior to start of TAB.
- .2 Start TAB when building is essentially completed, including:
 - .1 Pressure, leakage, other tests specified elsewhere Division 23.

- .2 Provisions for TAB installed and operational.
- .3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
 - .1 Proper thermal overload protection in place for electrical equipment.
 - .2 Liquid systems:
 - .1 Flushed, filled, vented.
 - .2 Correct pump rotation.
 - .3 Strainers in place, baskets clean.
 - .4 Isolating and balancing valves installed, open.
 - .5 Calibrated balancing valves installed, at factory settings.
 - .6 Chemical treatment systems complete, operational.
 - .3 Air systems:
 - .1 Filters in place, clean.
 - .2 Duct systems clean.
 - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
 - .4 Correct fan rotation.
 - .5 Fire, smoke, volume control dampers installed and open.
 - .6 Coil fins combed, clean.
 - .7 Access doors, installed, closed.
 - .8 Outlets installed, volume control dampers open.

1.11 APPLICATION TOLERANCES

- .1 Do TAB to following tolerances of design values:
 - .1 Hydronic systems: plus or minus 5%.
 - .2 Laboratory HVAC systems: plus 5%, minus 0%.
 - .3 HVAC systems: plus or minus 5%.

1.12 ACCURACY TOLERANCES

- .1 Measured values accurate to within plus or minus 2% of actual values.

1.13 INSTRUMENTS

- .1 Prior to TAB, submit to Departmental Representative list of instruments used together with serial numbers.
- .2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- .3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

1.14 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit, prior to commencement of TAB:
 - .1 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.15 PRELIMINARY TAB REPORT

- .1 Submit for checking and approval of Departmental Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
 - .1 Details of instruments used.
 - .2 Details of TAB procedures employed.
 - .3 Calculations procedures.
 - .4 Summaries.

1.16 TAB REPORT

- .1 Format in accordance with referenced standard.
- .2 TAB report to show results in SI units and to include:
 - .1 Project record drawings.
 - .2 System schematics.
- .3 Submit one copy of TAB Report to Departmental Representative for verification and approval, in French in D-ring binders, complete with index tabs. Submit five copies following approbation.

1.17 VERIFICATION

- .1 Reported results subject to verification by Departmental Representative.
- .2 Provide personnel and instrumentation to verify up to 30% of reported results.
- .3 Number and location of verified results as directed by Departmental Representative.
- .4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.

1.18 SETTINGS

- .1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, and ensure sensors are at required settings.
- .2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.19 COMPLETION OF TAB

- .1 TAB considered complete when final TAB Report received and approved by Departmental Representative.

- ① **1.20 AIR SYSTEMS**
- .1 Standard: TAB to most stringent of this section and as per TAB standards of AABC and SMACNA (HVAC Air Duct Leakage Test Manual, 3rd Edition, August 2002).
 - .2 Do TAB of following systems, equipment, components, controls:
 - .1 Ventilation unit no URC (fresh air).
 - .2 Ventilation unit no U-1 (building air supply).
 - .3 Ventilation unit no U-2 (lab hood make-up air).
 - .4 Ventilation unit no U-3 (A-3 recirculation).
 - .5 Ventilation unit no U-4 (building air supply).
 - .6 Ventilation unit no U-5 (boiler room unit).
 - .7 87 VAV terminal units.
 - .3 Qualifications: personnel performing TAB current member in good standing of AABC or NEBB.
 - .4 Quality assurance: perform TAB under direction of supervisor qualified to standards of AABC or NEBB.
 - .5 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
 - .6 Locations of equipment measurements: to include as appropriate:
 - .1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.
 - .2 At controllers, controlled device.
 - .7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).
- ① **1.21 LIQUID SYSTEM**
- .1 Do TAB of following systems, equipment, components, controls:
 - .1 All control valve shown on the hydraulic schematic;
 - .2 All valve indicated below, as indicated in the valves table of the Phase 1 documents (COMMAND).
 - .1 Sixty-eight valves DN ½.
 - .2 Five valves DN ½.
 - .3 Twelve valves DN 1.
 - .4 One valve DN 1½.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

- .4 TIAC Code: A-6:
 - .1 Insulation securements: as per manufacturer recommendations.
 - .2 Seals: lap seal adhesive, lagging adhesive.
 - .3 Installation: as per manufacturer recommendations.
- .5 Thickness of insulation as listed in following table.
 - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
 - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application Run out	Temperature °C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)			
			to 1	1 1/4 to 2	2 1/2 to 4	5 to 6
Steam	up to 175	A-1	38	50	65	75
Steam, Saturated and Super heated	over 175	A-1	38	65	65	75
Condensate Return	60 - 94	A-1	25	38	38	38
Boiler Feed Water		A-1	25	25	25	25
Hot Water Heating	60 - 94	A-1	25	38	38	38
Hot Water Heating	up to 59	A-1	25	25	25	25
Glycol Heating	60 - 94	A-1	25	38	38	38
Glycol Heating	up to 59	A-1	25	25	25	25
① Tempered Water	18 - 35	A-1	25	25	25	25
Domestic HWS		A-1	25	25	25	38
Chilled Water	4 - 13	A-3	25	25	25	25
① Chilled Glycol	4 - 13	A-3	25	25	25	25
Domestic CWS		A-3	25	25	25	25
Refrigerant, hot gas liquid, suction	4 – 13	A-6	25	25	25	25

- .6 Finishes:
 - .1 Exposed indoors: canvas jacket.
 - .2 Exposed in mechanical rooms: canvas jacket.
 - .3 Concealed, indoors: canvas on valves, fittings. No further finish.
 - .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
 - .5 Outdoors: PVC jacket.
 - .6 Finish attachments: as per manufacturer recommendation.
 - .7 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

- .4 Double check valve assembly with discharge valve for reduced pressure assembly type.
- .5 Low risk: supply water for glycol pressurisation system.
 - .1 Such as Watts model no 007.
- .6 High risk: closed circuit network, make-up water for steam boiler, condensate cooler.
 - .1 Such as Watts model no 009.
- .7 Installed as per CSA-B64 standard.

2.4 PIPE LINE STRAINER

- .1 NPS 1/2 to 2: bronze body to ASTM B62, screwed connections, Y pattern.
- .2 NPS 2 1/2 to 12: cast iron body to ASTM A278/A278M, Class 30, flanged connections.
- .3 Blowdown connection: NPS 1.
- .4 Screen: stainless steel with:
 - .1 Steam: 0.8 mm perforations.
 - .2 Water: 1.19 mm perforations.
- .5 Working pressure: 860 kPa.

2.5 SUCTION DIFFUSER

- .1 Body: cast iron with flanged connections.
- .2 With no built-in strainer.
- .3 Full length straightening vanes.
- .4 Pressure gauge tapings.

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2.6 DIAPHRAGM TYPE EXPANSION TANK

- .1 Vertical steel buffer tank, with internal baffle, as per ASME section VIII, Division I standards.
- .2 Capacity: 760 L.
- .3 Size: 1584 mm high x 762 mm diameter.
- .4 Working pressure: 860 kPa.
- .5 In-line flanged connection.
- .6 Base mount for vertical installation.
- .7 Buffer tank such as Amtrol model CWBT200-6 or a replacement product approved by addendum as per tenderers instruction.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic specialties installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and data sheets.

- .2 Positive displacement pump, ODP motor, 0.33 HP, 1725 rpm, flow of 3.91 l/s at 345 kPa with internal safety valve, and with the following:
 - .1 Adjustable pressure switch.
 - .2 Glycerine filled pressure gauge.
 - .3 Check-valve.
 - .4 Control panel:
 - .1 NEMA 1 housing.
 - .2 Three position selector for the pump.
 - .3 Two position selector for the alarm.
 - .4 10 A fuse.
 - .5 Alarm.
 - .6 DEL indicator for: voltage indicator, pump working, low level, pressure problem, alarm.
 - .7 Low level protection (stop).
 - .8 Alarm output for system integration.
 - .9 Fish type connecting cable, minimum 1524 mm.
 - .5 120/1/60.
 - .6 Agitation system in order to keep homogenous dilution.
 - .7 Copper type L piping and fitting.
- .3 System completely factory assemble and tested such as Magnus model PGM022B.

2.7 COOLING TOWER CHEMICAL TREATMENT

- ① .1 Supply an automatic water treatment system for a 100 tons cooling tower no T-4. System is made of the following:
 - .1 Impulsion water meter.
 - ① .2 SCH 80 PVC piping with valves.
 - .3 Three electronic metering pump with adjustable flow. Pump must be fixed on the equipment with suction piping.
 - .4 Three low level switch.
 - .5 Complete suction and discharge piping with strainer at each pump.
 - .6 Injection coupling installed on cooling tower piping.
 - .7 Balancing valve for the drainage, solenoid valve for drainage, conductivity probe, preinstalled flow switch on the piping who will manage the system operation with cooling tower operation.
 - .8 Microprocessor conductivity equipment with NEMA 4X housing and with the following characteristics:
 - .1 Conductivity control.
 - .2 Indicating light for:
 - .1 High level conductivity.
 - .2 Low level conductivity.

- .3 Indicating light for state of control:
 - .1 Inhibitor injection.
 - .2 Algaecide injection no 1.
 - .3 Algaecide injection no 2.
 - .4 No flow in the monitor.
 - .4 Variable mode for inhibitor injection:
 - .1 With the water meter.
 - .2 With the % of drainage.
 - .3 With the % of running time.
 - .4 Simultaneously with the drainage.
 - .5 Possibility to shift the drainage following biocide injection.
 - .6 Possibility to do a pre-drainage prior to a biocide injection in order to prevent the loss.
 - .7 Water temperature indicator in the monitor.
 - .8 Cumulated amount of flow following drainage.
- ① .2 Factory preassemble and tested, ready to be installed system, such as Magnus model Monitour 2.0, 100 tons.
- .3 Provide following chemical:
- .1 1 x 24 kg of Magnatrol 283A.
 - .2 1 x 21 kg of Magnatrol 450A.
 - .3 1 x 21 kg of Magnatrol 41 A.
- ① .4 Supply an automatic water treatment system for the 30 tons cooling tower no T-1. System is made of the following:
- .1 Impulsion water meter.
 - .2 SCH 80 PVC piping with valves.
 - .3 Three electronic metering pump with adjustable flow. Pump must be fixed on the equipment with suction piping.
 - .4 Three low level switch.
 - .5 Complete suction and discharge piping with strainer at each pump.
 - .6 Injection coupling installed on cooling tower piping.
 - .7 Balancing valve for the drainage, solenoid valve for drainage, conductivity probe, preinstalled flow switch on the piping who will manage the system operation with cooling tower operation.
 - .8 Microprocessor conductivity equipment with NEMA 4X housing and with the following characteristics:
 - .1 Conductivity control.
 - .2 Indicating light for:
 - .1 High level conductivity.
 - .2 Low level conductivity.

- .3 Indicating light for state of control:
 - .1 Inhibitor injection.
 - .2 Algaecide injection no 1.
 - .3 Algaecide injection no 2.
 - .4 No flow in the monitor.
- .4 Variable mode for inhibitor injection:
 - .1 With the water meter.
 - .2 With the % of drainage.
 - .3 With the % of running time.
 - .4 Simultaneously with the drainage.
- .5 Possibility to shift the drainage following biocide injection.
- .6 Possibility to do a pre-drainage prior to a biocide injection in order to prevent the loss.
- .7 Water temperature indicator in the monitor.
- .8 Cumulated amount of flow following drainage.
- .2 Factory preassemble and tested, ready to be installed system, such as Magnus model Monitour 2.0, 30 tons.
- .3 Provide following chemical:
 - .1 1 x 24 kg of Magnatrol 283A.
 - .2 1 x 21 kg of Magnatrol 450A.
 - .3 1 x 21 kg of Magnatrol 41 A.

2.8 CHEMICAL FEED PIPING

- .1 Resistant to chemicals employed. Pressure rating: 860 kPa.

2.9 CHEMICAL FEED PUMPS

- .1 Electronic metering diaphragm type: flow range 0-100%, adjustable, plus or minus 1.0% accuracy (repetitive), on-off operation, with pressure relief valve, check valve, foot valve, injection fitting.

2.10 SHIPPING/FEEDING CHEMICAL CONTAINERS

- .1 High density moulded polyethylene, with liquid level graduations, cover.

2.11 CONDUCTIVITY CONTROLLER

- .1 Fully transistorized, suitable for wall or flush panel mounting, linear over full measuring range of 0-5000 microhms.
- .2 Insensitive to phase angle shifts, capable of operating on 95-130 V without affecting accuracy, power, bleedoff status lights.

2.12 CONDUCTIVITY PROBES

- .1 Dual carbon elements in PVC holder, quick disconnect, self-locking connection.

- .2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.
- .3 Gaskets: neoprene.
- .4 Hardware:
 - .1 Up to 300 x 300 mm: two sash locks.
 - .2 301 to 450 mm: four sash locks.
 - .3 451 to 1000 mm: piano hinge and minimum two sash locks.
 - .4 Doors over 1000 mm: piano hinge and two handles operable from both sides.
 - .5 Hold open devices.
 - .6 300 x 300 mm glass viewing panels.

①

2.3 MULTI-LEAF DAMPERS

- .1 Opposed blade type as indicated.
- .2 Extruded aluminum, interlocking blades, complete with extruded vinyl seals, spring stainless steel side seals, extruded aluminum frame.
- .3 Pressure fit self-lubricated bronze bearings.
- .4 Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.
- .5 Performance:
 - .1 Leakage: in closed position less than 25 L/S/m² at 1000 Pa differential across damper.
- .6 Insulated aluminum dampers:
 - .1 Frames: insulated with extruded polystyrene foam with RSI 0.88.
 - .2 Blades: constructed from aluminum extrusions with internal hollows insulated with polyurethane or polystyrene foam, RSI 0.88.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for air duct accessories installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Contractor must plan and coordinate the replacement of the energy recovery wheel with the manufacturer.
 - .2 It is imperative that the contractor get the on-site technical support from the manufacturer for the replacement of the wheel.
 - .3 Contractor must work jointly with the technical staff of the manufacturer that will be on-site and apply requested requirements and recommendations.
 - .4 Plan sufficient period for the personal training with the new wheel, accessories and control panel.
- .2 Access Doors and Viewing Panels:
- .1 Size:
 - .1 1219 mm x 610 mm for person size entry.
 - .2 508 mm x 508 mm for servicing entry.
 - .3 300 mm x 300 mm for viewing.
 - .4 As indicated.

GLYCOL COIL SPECIFICATIONS							
Identification			SERP-001 ①				
Location			U-2				
Air	Flow (L/s)		9270				
	Velocity (m/s)		3.91				
	PDA (Pa)		0.14				
	T° inlet (°C)	DB	-29				
		WB	---				
	T° outlet (°C)	DB	10				
WB		---					
PG50% (Heating)	Flow (L/s)		3.28				
	PDW (kPa)		30				
	T° inlet (°C)		64				
	T° outlet (°C)		28				
Coil specifications	Type		5WH0904A				
	Rows		4				
	Fins		9				
	Number of circuits		Half				
	Height (mm)		1372				
	Length (mm)		1727				
	Quantity		1				
	Total surface (m²)		2.369				
	Instal- lation	Hor.					
Vert.		X					
Comments							
Legend : DB : dry bulb WB : wet bulb PDA : static pressure drop, air side PDW : static pressure drop, hot water side Comments : 1 maximum fluide pressure drop of 35 kPa. 2 model number as per heatcraft company.							

END OF SECTION

① Addendum no. M-1, issued on June 7, 2016



ADDENDUM NO. E-1

Project: Research and development center
of Sherbrooke

Description: Modifications on specifications

Project no.: 2012-186-103-1

Division: 26 - Electricity

By: Robert Bigras, eng.

Date: 2016-06-07



1. This addendum shall be part of original drawings and specifications and shall form part of the contractual documents. Bidders shall make sure that the cost of this addendum is included in the bid amount.
2. Documents:
 - 2.1 Included documents:
 - 2.1.1 Specifications:

Section 28 31 00.01, issued.
 - 2.1.2 Plans nos.:
 - R_078727001-E01-GL-LIS, revision no. 1.
 - R_078727001-E02-SE-DEM-LIS, revision no.1.
 - R_078727001-E03-SE-NOU-LIS, revision no.1.
 - R_078727001-E04-DT-DEM-LIS, revision no.1.
 - R_078727001-E05-DT-NOU-LIS, revision no.1.
 - R_078727001-E07-DT-NOU-LIS, revision no.1.
 - R_078727001-E10-EQ-DEM-PLN-B1-N3, revision no.1.
 - R_078727001-E11-EQ-NOU-PLN-B1-N3, revision no.1.
 - R_078727001-E13-EE-NOU-PLN-B1-N3, revision no.0.
3. Description of work:
 - 3.1 Replacement of the systems nos. U-1A, U-1R, U-2A and of the panel no. P-301-R.
 - 3.2 Addition of equipments for chemical treatment.
 - 3.3 Addition of addressable relays the systems nos U-1, U-2 and U-4.

Part 1 General

1.1 REFERENCES

- .1 Treasury Board of Canada Secretariat (TBS), Occupational Safety and Health (OSH)
 - .1 Fire Protection Standard-10.
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-06, Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S531-02, Standard for Smoke Alarms.
 - .3 CAN/ULC-S537-04, Standard for the Verification of Fire Alarm Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for multiplex fire alarm system and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on shop drawings:
 - .1 Overall system riser wiring diagram identifying control equipment, initiating zones, signalling circuits; identifying terminations, terminal numbers, conductors and raceways.
 - .2 Details for devices.
 - .3 Step-by-step operating sequence, cross referenced to logic flow diagram.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for fire alarm system for incorporation into manual.
- .3 Include:
 - .1 Technical data - illustrated parts lists with parts catalogue numbers.
 - .2 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
 - .3 List of recommended spare parts for system.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESCRIPTION OF EXISTING SYSTEM

- .1 Addressable:
 - .1 Fire alarm system, zoned, coded single stage.
 - .2 Manufacturer: Notifier.
 - .3 Technology: NFS-320C.
- .2 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

2.2 SYSTEM OPERATION: SINGLE STAGE - SIGNALS ONLY

- .1 Actuation of any alarm in system U-1 initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.
 - .2 Indicate zone of alarm at central control unit and remote annunciator and display.
 - .3 Cause audible signalling devices to sound continuously throughout building and at central control unit.
 - .4 Transmit signal to fire department via master fire alarm box central station.
 - .5 Cause fans to shut down of system U-1.
 - .6 Cause fire doors and smoke control doors, if normally held open, to close automatically.
- .2 Actuation of any alarm in system U-2 initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.
 - .2 Indicate zone of alarm at central control unit and remote annunciator and display.
 - .3 Cause audible signalling devices to sound continuously throughout building and at central control unit.
 - .4 Transmit signal to fire department via master fire alarm box central station.
 - .5 Cause fans to shut down of system U-2.
 - .6 Cause fire doors and smoke control doors, if normally held open, to close automatically.

- .3 Actuation of any alarm in system U-3 initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.
 - .2 Indicate zone of alarm at central control unit and remote annunciator and display.
 - .3 Cause audible signalling devices to sound continuously throughout building and at central control unit.
 - .4 Transmit signal to fire department via master fire alarm box central station.
 - .5 Cause fans to shut down of system U-3.
 - .6 Cause fire doors and smoke control doors, if normally held open, to close automatically.
- .4 Actuation of any alarm in system U-4 initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.
 - .2 Indicate zone of alarm at central control unit and remote annunciator and display.
 - .3 Cause audible signalling devices to sound continuously throughout building and at central control unit.
 - .4 Transmit signal to fire department via master fire alarm box central station.
 - .5 Cause fans to shut down of system U-4.
 - .6 Cause fire doors and smoke control doors, if normally held open, to close automatically.
- .5 Acknowledging alarm: indicated at central control unit.
- .6 Ensure that it is possible to silence signals by "alarm silence" switch at control unit, after 60 seconds period of operation.
- .7 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.
- .8 Actuation of supervisory devices to:
 - .1 Cause electronic latch to lock-in supervisory state at central control unit.
 - .2 Indicate respective supervisory zone at central control unit and at remote annunciator display.
 - .3 Cause audible signal at central control unit to sound.
 - .4 Activate common supervisory sequence.
- .9 Resetting alarm supervisory device not to return system indications/functions back to normal until control unit has been reset.
- .10 Trouble on system to:
 - .1 Indicate circuit in trouble at central control unit.
 - .2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication; whereas visual indication to remain until trouble is cleared and system is back to normal.
- .11 Trouble on system: suppressed during course of alarm.
- .12 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 AUXILIARY CIRCUITS

- .1 Auxiliary contacts for control functions.
- .2 Actual status indication (positive feedback) from controlled device.
- .3 Alarm supervisory trouble on system to cause operation of programmed auxiliary output circuits.
- .4 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.
- .5 Fans: stagger-started upon system reset; timing circuit to separate starting of each fan or set of fans connected to auxiliary contact on system.
 - .1 Timing circuit: controlled by CCU.
- .6 Auxiliary circuits: rated at 2 A, 24 Vdc or 120 Vac, fuse-protected.

2.4 WIRING

- .1 Type FAS-105 copper conductors rated 300 V in PVC insulation.
- .2 To initiating circuits: Twisted 18 AWG minimum, and in accordance with manufacturer's requirements.
- .3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.
- .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.

2.5 END-OF-LINE DEVICES

- .1 End-of-line devices to control supervisory current in alarm circuits and signalling circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

2.6 AUXILIARY DEVICES

- .1 Remote relay unit to initiate fan shutdown.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for fire alarm installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524 and TB Fire Protection Standard.
- .2 Connect alarm circuits to main control panel.
- .3 Install end-of-line devices at end of alarm and signalling circuits.
- .4 Install remote relay units to control fan shut down.
- .5 Splices are not permitted.
- .6 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
- .7 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.
- .2 Fire alarm system:
 - .1 Test such device and alarm circuit to ensure manual stations, thermal detectors, smoke detectors transmit alarm to control panel and actuate first stage alarm, general alarm and ancillary devices.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of systems.
 - .4 Addressable circuits system style DCLB:
 - .1 Test each conductor on all DCLB addressable links for capability of providing 3 or more subsequent alarm signals on line side of single open-circuit fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Place materials defined as hazardous or toxic waste in designated containers.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by fire alarm system installation.

3.6 CLOSEOUT ACTIVITIES

- .1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

3.7 MAINTENANCE

- .1 Provide individual price on tender form for subsequent PROM re-burns.
- .2 Provide individual price on tender form for temporary program changes during construction period, to include zone labels, control functions, system operation.

END OF SECTION

ADDENDUM n° S-01

Owner : Agriculture and Agri-Food Canada

Project : SRDC Lennoxville

Project number Owner: R.078727.001

Date : 2016.06.08

Please acknowledge the reception of this addendum by mentioning its number on the proper tender page, or else your bid could be rejected.

This addendum contains 4 pages in total.

- **Changes to layout of steel structure on roof**

The layout of steel structure on roof was modified to passage of chimneys. Providing the modification of guy cable if needed.

- **Changes the connections of new columns.**

The connections of the new columns are now bolted. See changes on page S02.

Issued by: Eduardo Carvalho, ing. Signature : 

P.J. : Plans S00 to S02 (3 Sheets A1)

ADDENDUM n° C-01

Owner : Agriculture and Agri-Food Canada

Project : SRDC Lennoxville

Project number Owner: R.078727.001

Date : 2016.06.08

Please acknowledge the reception of this addendum by mentioning its number on the proper tender page, or else your bid could be rejected.

This addendum contains 4 pages in total.

- **Changes to geometry and Layout**

The new concrete sidewalk is extended as to complete the link between the two existing buildings.

- **Existing concrete slab supporting the underground watertanks.**

The approximative thickness of the concrete slab under the tanks is 350 mm.



2016-06-08

Issued by: Nicolas Leblanc, ing. Signature : _____

P.J. : Plans C00 to C02 (3 Sheets A1)