National Research Council Canada
Administrative Services and
Property Management Branch

Conseil national de recherches Canada
Direction des services administratifs et
gestion de l'immobilier

REQUEST FOR PROPOSALS
DEMANDE DE PROPOSITIONS

RETURN BIDS TO :
RETOURNER LES SOUMISSIONS À:

National Research Council Canada (NRC)
Procurement Services
1200 Montreal Road, Building M-22
Ottawa, Ontario
K1A 0R6
Bid Fax: (613) 991-3297

Title/Sujet **Smart Building Monitoring and On-going Commissioning – Trenton, Kingston**	
Solicitation No./N. de l'invitation **17-22057**	**Date** **14 September 2017**
Solicitation Closes/L'invitation prend fin **at/à** **14 :00** **on/le** 25 October 2017	**Time Zone/Fuseau Horaire** **EDT**
Address Enquiries To/Adresser demandes de renseignements à : Collin Long Telephone No./N. de téléphone : **(613)993-0431** Facsimile No./N. de télecopieur : **(613) 991-3297**	

Instructions: See Herein

Instructions: Voir aux présentes

Proposal To:

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

Proposition aux:

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

Canada

Vendor/Firm Name and Address **Raison sociale et adresse du fournisseur/de l'entrepreneur** **Telephone No./N. de telephone** **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 autorisé à signer au nom du fournisseur/de l'entrepreneur (taper ou écrire en caractères d'imprimerie)** **Signature** **Date**

Smart Building Monitoring and On-going Commissioning – Trenton, Kingston

1.0 PRESENTATION OF PROPOSALS

1.1 You are invited to submit four copies of a Technical Proposal and two copies of a Financial Proposal in two separate envelopes to fulfil the following requirement forming part of this Request for Proposals. One envelope **must** be clearly marked 'Technical Proposal' and the other envelope **must** be marked 'Financial Proposal'. All financial information **must** be fully contained in the Financial Proposal, and only in the Financial Proposal. Vendors who provide financial information in the technical proposal will be disqualified. **All proposals should include the front page of this RFP duly completed.**

2.0 SCOPE OF WORK

2.1 To provide Professional Services for **Smart Building Monitoring and On-Going Commissioning** in accordance with the detailed Statement of Work attached as Appendix **"A".**

3.0 PERIOD OF CONTRACT

3.1 NRC anticipates that the work will begin on **31 October 2017** and be completed by **March 31, 2018.**

3.2 Subject to NRC's satisfaction of the contractor's performance, an extension to the original tender may be issued for the remaining sites listed in Appendix "B" – List of Buildings. Payment will be limited to the rates quoted in the contractor's proposal, as applicable to the additional buildings identified in Appendix "B". NRC will not be bound or committed to any minimum annual purchase. Additional work arising from this contract is subject to a detailed technical review and a Contract Amendment authorizing the additional work. Additional work may be subject to further cost negotiation.

4.0 ENQUIRIES

4.1 If you require clarification regarding any aspect of this RFP, address all queries to the Contracting Authority, identified below, at least ten (10) working days before the closing date. All queries must be in writing and queries received less than then (10) working days prior to the closing date cannot be guaranteed a response. Information received verbally will not be binding upon the NRC.

Collin Long
Procurement Officer, Procurement Services
National Research Council Canada
1200 Montreal Road, Bldg. M-22
Ottawa, Ontario K1A 0R6 Telephone: **613-993-0431**
Facsimile: **613-991-3297**

4.2 To ensure the equality of information among Bidders, responses to general enquiries will be made available to all bidders unless such publications would reveal proprietary information. The bidder who initiates the question will not be identified. Technical questions that are considered proprietary by the bidder must be clearly identified. NRC will respond individually to the bidder if it considers the questions proprietary. If NRC does not consider the question proprietary, the bidder submitting it will be allowed to withdraw the question, or have the question and answer made available through the Open Bidding System (OBS) to all bidders.

4.3 Vendors who attempt to obtain information regarding any aspect of this RFP during the solicitation period through any NRC contacts other than the Contracting Authority identified herein, may be disqualified (for that reason alone).

4.4 It is the responsibility of the Bidder to obtain clarification of the requirement contained herein, if necessary, prior to submitting its proposal. The Bidder must have written confirmation from the Contracting Authority for any changes, alterations, etc., concerning this RFP.

5.0 PROPOSAL CLOSING DATE AND BID SUBMISSION INSTRUCTIONS

5.1 Proposals must be delivered not later than 2:00 PM EST, (day), **25 October 2017**, to the following **Contracting Authority**:

Collin Long
Procurement Officer, Procurement Services
National Research Council Canada
1200 Montreal Road, Bldg. M-22
Ottawa, Ontario K1A 0R6 Telephone: (613) 993-0431

Proposals must not be sent directly to the Project Authority

5.2 Proposals must be delivered in a sealed envelope and the Bidder's name and the RFP No. should be clearly indicated on the Proposal Envelope. It is the vendor's responsibility to obtain date and time stamped receipt signed by the receptionist as proof that NRC has received their proposal within the prescribed time limit. All risks and consequences of incorrect delivery of bids are the responsibility of the Bidder.

5.3 Bid submissions must be in accordance with the Standard Instructions and Conditions (Applicable to Bid Solicitation) attached as Appendix **"F"** – Standard Instructions and Conditions (Applicable to Bid Solicitation)

5.4 Due to the nature of this solicitation, NRC will not accept any proposal documents by facsimile.

5.5 NRC will not accept any proposal documents by electronic mail or on diskette.

5.6 Proposals received after the closing date will not be considered and will be returned to the sender. The sender has the sole responsibility for the timely dispatch and delivery of a proposal and cannot transfer such responsibility to the NRC. No supplementary information will be accepted after the closing deadline unless NRC requests a clarification.

5.7 All submitted proposals become the property NRC and will not be returned to the originator.

6.0 EVALUATION CRITERIA

6.1 Refer to Appendix "**C**" – Mandatory Requirements Checklist and Rated Requirements Checklist

7.0 COST PROPOSAL

7.1 The cost proposal must be a **fixed price quotation, FOB Destination, excluding GST/HST.** The fixed price must include all the materials and services required to fulfil all aspects of the Statement of Work. Bidders should identify the currency on which the cost proposal is based.

7.2 The cost proposal must have sufficient structure to show how the total proposed cost was calculated. It should contain the following elements:

a) A turnkey solution pricing for the site(s) listed in Appendix "B" – List of Buildings. Clearly state all assumptions, if any.

b) A detailed cost breakdown as appropriate.

c) A clear statement whether the turnkey solution pricing includes or excludes the annual monitoring service of the first year.

d) An annual monitoring service pricing for the site(s) listed in Appendix "B" – List of Buildings. This cost shall include periodical system updates and system maintenance.

e) Information on any additional costs and pricing that would apply on a one-time or on-going basis.

f) Deployment cost for an additional building of the same complexity; annual fee for an additional building of the same complexity; and any other associated cost for an additional building of the same complexity.

g) The amount and explanation for other miscellaneous expenses that could be incurred.

h) Describe its capacity to implement additional buildings on successful completion of the current contract, should PSPC decide to include additional buildings.

i) Provide estimated pricing for each additional building with the same level of complexity.

j) Provide hourly rates for all staff.

7.3 GOODS AND SERVICES TAX (GST) and HARMONIZED SALES TAX (HST): The GST and HST, whichever is applicable, shall be considered an applicable tax for the purposes of this RFP and extra to the price herein. The amount of GST or HST shall be disclosed and shown as a separate item.

7.4 Bids will be evaluated in Canadian currency, therefore, for evaluation purposes, the exchange rate quoted by the Bank of Canada as being in effect on date of bid closing, shall be applied as the conversion factor for foreign currency. Prices quoted shall not be subject to, or conditional upon, fluctuations in commercial or other interest rates during either the evaluation or contract period.

8.0 **CONDITIONS OF SUBMISSION**

8.1 There shall be no payment by the National Research Council for costs incurred in the preparation and submission of proposals in response to this request. No payment shall be made for costs incurred for clarification(s) and/or demonstration(s) that may be required by NRC. The National Research Council reserves the right to reject any or all proposals submitted, or to accept any proposal in whole or in part without negotiation. A contract will not necessarily be issued as a result of this competition. NRC reserves the right to amend, cancel or reissue this requirement at any time.

8.2 Proposals submitted must be valid for not less than sixty (60) calendar days from the closing date of the RFP.

8.3 Your proposal should contain the following statement:

"We hereby certify that the price quote is not in excess of the lowest price charged anyone else, including our most favoured customer, for like services".

8.4 Any contract resulting from this invitation will be subject to the General Conditions – Services 2035 (copy attached as Appendix "D" – General Conditions 2035) and any other special conditions that may apply

9.0 Basis of Selections

9.1 The method of selection will be highest combined Technical Rating (80%) and Price (20%). Proposals must respond to the mandatory requirements outlined in Appendix "C" – Mandatory and Rated Requirements Checklist and must include the referenced Section/Page in Bidder's proposal. Any proposal that fails to indicate clearly that all mandatory requirements have been met will receive no further consideration. The Rated requirements outlined in Appendix "C" – Mandatory and Rated Requirements Checklist will be assessed according to the evaluation scale in Appendix "D" – Scoring Scale.

9.2 The lowest priced proposal is allocated the maximum points of 20 while the other proposals are prorated against the financial bid. See example below which demonstrates a 80/20 ratio of the technical score and price respectively.

Total Score = Technical Score/125*80 + (Lowest Financial Bid/Bidder Price)*20

Note that the five-year financial cost will be calculated for the purpose of financial scoring even though the initial contract will be issued for one year.

Sample:

Bidder A – five-year financial cost (first year total cost + annual fee x 4): $500.00
Bidder B – five-year financial cost (first year total cost + annual fee x 4): $700.00
Bidder C – five-year financial cost (first year total cost + annual fee x 4): $900.00

	Technical Rating	Financial Score	Total Score	Ranking
Bidder A	90/125*80 = 57.60	500/500*20 = 20.00	77.60	3rd
Bidder B	110/125*80 = 70.40	500/700*20 = 14.29	84.69	1st
Bidder C	105/125*80 = 67.20	500/900*20 = 11.11	78.31	2nd

10.0 OWNERSHIP OF INTELLECTUAL AND OTHER PROPERTY

10.1 All confidential information gathered or viewed or any product developed as a result of this RFP must be treated as confidential and as NRC property

11.0 CONFIDENTIALITY

11.0 This document is UNCLASSIFIED, however; the contractor shall treat as confidential, during as well as after the services contracted for, any information of the affairs of NRC of a confidential nature to which its servants or agents become privy.

12.0 CRIMINAL CODE OF CANADA

12.1 Canada may reject an offer where the Bidder, or any employee or subcontractor included as part of the offer, has been convicted under section 121 ("Frauds on the government" &

Contractor subscribing to election fund"), 124 ("Selling or purchasing office"), or 418 ("Selling defective stores to Her Majesty") of the Criminal Code.

13.0 **DEBRIEFINGS**

13.1 After contract award, bidders may request a debriefing on the results of the bid solicitation. Bidders should make the request to the Contracting Authority within 15 working days of receipt of notification that their bid was unsuccessful. The debriefing may be provided in writing, by telephone or in person.

ADDITIONAL CONTRACT CLAUSES

Bidder compliance with all of the following clauses, terms and conditions of the resulting contract is mandatory.

14.0 **T4-A SUPPLEMENTARY SLIPS**

14.1 Pursuant to paragraph 221(1)(d) of the Income Tax Act, payments made by departments and agencies to contractors under applicable services contracts (including contracts involving a mix of goods and services) must be reported on a T4A Supplementary slip. To enable client departments and agencies to comply with this requirement, contractors are required to provide information as to their legal name and status, business number, and/or Social Insurance Number or other identifying supplier information as applicable, along with a certification as to the completeness and accuracy of the information.

15.0 **GOVERNMENT SMOKING POLICY**

15.1 Where the performance of the work requires the presence of the Contractor's personnel on government premises, the Contractor shall ensure that its personnel shall comply with the policy of the Government of Canada, which prohibits smoking on any government premises.

16.0 **ACCESS TO GOVERNMENT FACILITIES / EQUIPMENT**

16.1 Access to the facilities and equipment necessary to the performance of the work shall be provided through arrangements to be made by the Project Authority named herein. There will be however; no day-to-day supervision of the Contractor's activities nor control of the Contractor's hours of work by the Project Authority.

16.2 The Contractor undertakes and agrees to comply with all Standing Orders and Regulations in force on the site where the work is to be performed, relating to the safety of persons on the site or the protection of property against loss or damage from any and all causes including fires.

17.0 **GENERAL CONDITIONS**

17.1 The General Conditions 2035 entitled General Conditions Services and attached as Appendix **"E"** form part of this Contract.

18.0 **ADDITIONAL WORK**

18.1 The successful bidder can at NRC's option, be asked to provide additional work related to this requirement. Payment will be limited to the firm per diems quoted in the Contractor's proposal.

19.0 NON-PERMANENT RESIDENT (FOREIGN COMPANY)

19.1 The Contractor shall ensure that non-permanent residents intending to work in Canada on a temporary basis in fulfilment of the Contract, who are neither Canadian citizens nor United States nationals, receive all appropriate documents and instructions relating to Canadian immigration requirements and secure all required employment authorizations prior to their arrival at the Canadian port of entry. The Contractor shall ensure that United States nationals having such intentions receive all appropriate documents and instructions in that regard prior to their arrival at the Canadian port of entry. Such documents may be obtained at the appropriate Canadian Embassy/Consulate in the Contractor's country. The Contractor shall be responsible for all costs incurred as a result of non-compliance with immigration requirements.

20.0 NON-PERMANENT RESIDENT (CANADIAN COMPANY)

20.1 The Contractor is responsible for compliance with the immigration requirements applicable to non-permanent residents entering Canada to work on a temporary basis in fulfillment of the Contract. In some instances, the employment authorization necessary to enter Canada cannot be issued without prior approval of Human Resources Centre Canada (HRCC). HRCC should always be contacted as soon as the decision to bring in a non-permanent resident is made. The Contractor will be responsible for all costs incurred as a result of non-compliance with immigration requirements.

21.0 LUMP SUM PAYMENT - WORK FORCE REDUCTION PROGRAMS

21.1 It is a term of the contract that:

a. the Contractor has declared to the Departmental Representative whether the Contractor has received a lump sum payment made pursuant to any work force reduction program, including but not limited to the Work Force Adjustment Directive, the Early Departure Incentive Program, the Early Retirement Incentive Program or the Executive Employment Transition Program, which has been implemented to reduce the public service;

b. the Contractor has informed the Departmental Representative of the terms and conditions of that work force reduction program, pursuant to which the Contractor was made a lump sum payment, including the termination date, the amount of the lump sum payment and the rate of pay on which the lump sum payment was based; and

c. the Contractor had informed the Departmental Representative of any exemption in respect of the abatement of a contract fee received by the Contractor under the Early Departure Incentive Program Order or paragraph 4 of Policy Notice 1995-8, of July 28, 1995.

22.0 FORMER PUBLIC SERVANT

22.1 Contracts with former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, bidders must provide the information required below.

22.2 Definitions

For the purposes of this clause,

"former public servant" is any former member of a department as defined in the Financial Administration Act, R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

a) an individual;
b) an individual who has incorporated;
c) a partnership made of former public servants; or
d) a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means, a pension or annual allowance paid under the Public Service Superannuation Act (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the Supplementary Retirement Benefits Act, R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the Canadian Forces Superannuation Act, R.S., 1985, c.C-17, the Defence Services Pension Continuation Act, 1970, c.D-3, the Royal Canadian Mounted Police Pension Continuation Act , 1970, c.R-10, and the Royal Canadian Mounted Police Superannuation Act, R.S., 1985, c.R-11, the Members of Parliament Retiring Allowances Act , R.S., 1985, c.M-5, and that portion of pension payable to the Canada Pension Plan Act, R.S., 1985, c.C-8.

22.3 Former Public Servant in Receipt of a Pension

As per the above definitions, is the Bidder a FPS in receipt of a pension? **Yes** ( ) **No** ( )

If so, the Bidder must provide the following information, for all FPS in receipt of a pension, as applicable:

a) name of former public servant;
b) date of termination of employment or retirement from the Public Service.

22.4 By providing this information, Bidders agree that the successful Bidder's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with Contracting Policy Notice: 2012-2 and the Guidelines on the Proactive Disclosure of Contracts.

22.5 Work Force Reduction Program

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? **Yes** ( ) **No** ( )

If so, the Bidder must provide the following information:

a) name of former public servant;
b) conditions of the lump sum payment incentive;
c) date of termination of employment;
d) amount of lump sum payment;
e) rate of pay on which lump sum payment is based;
f) period of lump sum payment including start date, end date and number of weeks;

g) number and amount (professional fees) of other contracts subject to the restrictions of a work force reduction program.

22.6 For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is $5,000, including the Goods and Services Tax or Harmonized Sales Tax.

23.0 OFFICE OF THE PROCUREMENT OMBUDSMAN (OPO)

23.1 The Office of the Procurement Ombudsman (OPO) was established by the Government of Canada to provide an independent avenue for suppliers to raise complaints regarding the award of contracts under $25,000 for goods and under $100,000 for services. You have the option of raising issues or concerns regarding the solicitation, or the award resulting from it, with the OPO by contacting them by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca. You can also obtain more information on the OPO services available to you at their website at www.opo-boa.gc.ca.

24.0 SECURITY LEVEL

24.1 Prior to the performance of the obligations under this contract, all personnel that will be involved with the project must be cleared to the security level of **RELIABILITY** as defined in the security policy of

24.2 Any Contract resulting from this invitation will be subject to the Security Requirements Check List (SRCL), form TBS/SCT 350-103, attached at Appendix "K".

25.0 WORK LOCATION

The normal location of work for this assignment will as per the list of buildings in Appendix “B”.

25.0 ATTACHMENTS

Appendix "A" – Statement of Requirements
Appendix “B” – List of Buildings
Appendix “C” – Mandatory and Rated Requirements Checklist
Appendix "D" – Scoring Scale
Appendix “E” – General Conditions 2035
Appendix "F" – Standard Instructions and Conditions (Applicable to Bid Solicitation) dated 2007/06/01Bidders List
Appendix “G” – Health and Safety Requirements – Section 01 35 29.06
Appendix “H” – Commissioning Report TR000210 – Hangar 1
Appendix “I” – Commissioning Report TR110110 – Hangar 2
Appendix “J” – Commissioning Plan – EME Facility
Appendix “K” – Security Requirements Check List

Statement of Requirements

Smart Building Monitoring and On-going Commissioning

1. General

1.1 Project Title
Smart Building Monitoring and On-going Commissioning

1.2 Background
Department of National Defence (DND) is evaluating ways to improve its building operations and increase energy efficiency throughout its portfolio of properties by implementing Smart Building technologies.

National Research Council Canada (NRC) has been contracted by DND to conduct a study through the selection and deployment of Smart Building technologies in target buildings. The purpose is to determine the costs, benefits, and challenges of implementing such technologies in a broader set of DND buildings.

1.3 Overview
NRC on behalf of DND seeks an experienced Contractor for the purpose of providing building energy data collection, performance analytics, fault detection and diagnostics, and off-site monitoring solution for multiple buildings owned and operated by DND in order to assess improvements in energy and operational efficiencies associated with Smart Building technologies. This Statement of Requirements (SoR) is part of a competitive procurement process, which helps to ensure fairness while ensuring the interests of DND are served.

For ease of reference, each firm receiving this SoR is referred to as the “Bidder” and the Contractor selected to provide services for DND is referred to as the “selected Bidder”. This SoR states the instructions for submitting proposals, the procedure and criteria for selection, and the contractual terms by which NRC proposes to govern the relationship between it and the selected Bidder. Once a Contractor has been selected, NRC, on behalf of DND, intends to implement an agreement, which will define, and manage an off-site monitoring and ongoing commissioning program.

2. Mandatory Requirements – Scope of Work
This Section contains the requirements that shall be met in order for the Proposal to receive consideration. If, in the determination of NRC (on behalf of DND), the Proposal does not comply with one or more of these Mandatory Requirements, NRC (on behalf of DND) shall, without liability cost or penalty, eliminate the Proposal from further consideration in the SoR process. For the purposes of this SoR, “comply” and “compliance” means that the Proposal conforms to the Mandatory Requirements in this Section without material deviation. A material deviation is one:

A. that results in the material component of a Mandatory Requirement not being complied with; or
B. that affects in any substantial way the scope, quality or performance of what is being requested pursuant to this SoR.

2.1 General

The Bidder shall provide evidence to NRC and DND that the service requirements of this SoR will be met. The bidder shall submit one (1) original submission, one (1) electronic submission and six (6) hard-copies. The original submission and all hardcopies shall be compiled in a 3-ring binder. The Bidder's submission shall be organized with a title page, index, and sections in accordance with, and in the same order as, the sections provided in this SoR. Each section of the Bidders submission must address the requirements outlined in the corresponding section of this SoR. Bidders may add appendices if providing additional information.

All the buildings selected for this project currently have a Building Automation System (BAS) that generates data for use by proposed solutions. NRC and DND will provide the Bidder all available information about the target building including its BAS (name and maintenance service provider) via a commissioning report. Any gaps in the documentation shall be determined by the Bidder before bidding is closed.

The Bidder shall verify compatibility of the existing BAS with the Bidder's system and, if selected, will provide all necessary means to connect to the existing BAS. NRC and DND do not guarantee or imply compatibility of any of the existing BAS with the Bidder's solution.

The Bidder shall contact the relevant local utilities (electricity, water, and natural gas) to determine the availability of conservation program incentives, rebates or grants that are applicable to this project. If such programs are available, the selected Bidder is required to fulfill all program requirements in order to obtain all applicable utility incentives on behalf of the Crown. This includes, but not limited to, providing the local utility application documents, technical specifications, pictures, supporting calculations, measurement and verification plan, disposal certificates, invoices and proof of payments. For reference, a list of some incentive programs is provided at the following website. The selected Bidder is responsible for researching additional incentive programs that are not listed on the website:

http://www.nrcan.gc.ca/energy/funding/efficiency/4947

2.2 Components and Services

The solution shall include:

A. All software, middleware, and hardware components necessary to capture, store, analyze and transmit existing building points data;
B. Application Programming Interfaces (APIs) (usually implemented through Web services) for a third party to access collected energy meter data and all information regarding detected faults (and/or anomaly corrections);
C. Building Data Analytics and Fault Detection and Diagnostics (BDA/FDD) platform and services (detailed in 2.5);
D. Initial installation and configuration of the system that will interface with the Building Automation Systems (BAS);

E. All software upgrades which may become available, including new modules that include features previously unavailable in base product or which affect known DND operations, patches and firmware;
F. All support services provided during the period of performance (annual fee); and
G. A comprehensive warranty for the hardware/software solution (annual fee).

The components and services outlined above are described in detail in the subsequent sections.

NRC and DND shall have an unrestricted license (i.e., number of concurrent users, number of database connections, as long as all users are either Federal employees or contractors working on behalf of the Federal government). DND shall have unrestricted ownership rights to graphics and programming developed specifically under this contract (as opposed to the commercial off-the-shelf product that is initially licensed). All components must be owned and licensed to NRC and DND for use in Crown owned and managed facilities.

2.3 Building Automation System (BAS) Data Collection

The Bidder shall provide a flexible and scalable solution, including all necessary hardware, software, middleware, and technical support, to collect pertinent data from the existing Building Automation System (BAS) in the target building. This shall include any and all connectivity to interface with the existing BAS (including, but not limited to, gateways, routers, wiring, cellular hardware etc.) and for remotely transferring collected data to the Bidder's data repository. The solution must be completely independent of the BAS.

The BAS data collection shall be on a real-time basis (24 hours per day and 7 days per week) and shall be at an interval of 15 minute or less

2.4 Energy Metering Data Collection

The Bidder shall provide a solution to capture and analyze energy meter data on a real-time basis. The energy meter data shall include all of the following (if present in the building): electrical power, natural gas, steam, hot water, and chilled water. This real time energy consumption data shall be stored, analyzed, trended and presented in easily understandable real-time dashboards accessible to DND stakeholders (detailed in 2.7 and 2.9). The energy metering data collection shall be at an interval of 60 minutes or less.

2.5 Building Data Analytics and Fault Detection and Diagnostics

The Bidder shall provide Building Data Analytics and Fault Detection and Diagnostics (BDA/FDD) in conformance with this section.

The BDA/FDD shall have the ability to mine vast amounts of data quickly and apply software-based algorithms to identify and define trends so that more proactive management of building systems can occur. The BDA/FDD shall identify patterns that traditional BAS/BMS systems often overlook, draw conclusions, notify stakeholders, and offer corrective measures for issues in building mechanical and control systems via proactive automated maintenance recommendations before they manifest themselves in ways that cause downtime or prolonged periods of inefficient operation.

Results of the building data analytics shall be reviewed by the Bidder's Subject Matter Expert before being submitted to the building operator as an anomaly correction. Such notification shall include problem identification, and detailed actions of recommended corrective measures and potential sources of the anomaly. The notification shall also include estimated annual opportunity (cost savings, energy savings and related greenhouse gas equivalent) realized if the corrective measures are implemented.

The BDA/FDD shall provide:

A. Ability to allow building operators to optimize on-going operations through a series of processes including, but not limited to, fault based analysis, continuous evaluation of zones, set points, schedules, competing air handlers, unbalanced airflows, control component degradation, sensor failures, valve leakage, and loose fan belts.
B. Advanced continuous commissioning strategies capable of taking into account fault detection prior to seasonal weather changes (proactive building maintenance based on geographical and seasonal variables).
C. A response or notification in response to a detected fault, alarm, or operation anomaly;
D. Generate and distribute on a weekly basis, a summary of faults, alarms, or operation anomalies; and recorded distribution of notifications to Property Managers, Senior Property Managers, O&M Contractors, metering Contractors, specialized subject area engineers, and commissioning agents.

2.6 Continuous Commissioning and Building Optimization

The Bidder shall establish an ongoing process to resolve operating problems, improve occupant comfort, optimize energy use and identify retrofits to existing buildings and facilities. The process will ensure that the building, facilities and systems operate optimally to meet the current requirements. The solution shall capture energy consumption/demand data on an ongoing basis and provide 24/7 monitoring of any situation that may lead to excessive energy consumption and carry out real-time data analysis to identify energy savings opportunities.

To ensure building optimization, the selected Bidder shall work with the on-site DND representative and remotely to verify and optimize scheduling and system operation to assure optimal energy performance from the BAS.

At a minimum, the selected Bidder shall schedule and host a monthly meeting with DND's on-site representative and other required project partners to ensure anomalies are addressed.

The proposed system will not be used for automatic changes to the BAS; rather any recommended changes shall be provided, by electronic means, to the on-site DND representative, who would implement the changes at his/her discretion.

2.7 User Interface

The Bidder shall provide a secure Web based User Interface (UI) in conformance with this Section with no client software or browser plug-ins/add-ons required on Government Furnished Equipment (GFE) workstations. The following web browser version (minimum) is required and shall be supported:

- Microsoft Internet Explorer – Version 11

- Google Chrome – current version as of September 2017

- Firefox – current version as of September 2017

The UI shall:

A. Display building information simultaneously in multiple formats (e.g. AHU graphic, temperatures, and trends).
B. Display all information in both official languages (English and French) and shall offer the ability to select the language for the interface.
C. Use the SI measurement units.
D. Have tools that allow building engineers and stakeholders to create, analyze, view, and understand building system equipment trends.
E. Have non-proprietary open communication protocols (.csv, .xls and .ascii at a minimum).
F. Have Administrative and User privileges based on distinctive user IDs that include the ability to restrict access to individual users to specific functions.
G. Have the ability to create user defined alerts and notifications to building operators and O&M Contractors to reinforce analysis discovered by the system. These defined alerts shall be recorded and tracked for future troubleshooting and historical analysis.
H. Have the ability to track and record the above alerts and notifications for future troubleshooting and historical analysis;
I. Have the ability to identify and summarize notifications (anomaly corrections) that have been accepted (acknowledged) by the user and record the timestamp of such acknowledgment;
J. Have the ability to identify and summarize notifications (anomaly corrections) that have been closed (completed) by the user and record the timestamp of such completion;
K. Have an audit trail of changes featured under a System Administrators workbench or System Administrator only UI.

2.8 Demonstration of Targeted Savings

The system shall calculate and make available estimates of the opportunity cost, energy and GHG reduction opportunities associated with not correcting an identified fault or operational inefficiency. The opportunity (cost, energy and GHG savings) shall be reported as that accrued over a one-year period.

2.9 Data Visualisation

The Bidder shall provide a solution that is able to display building and energy related information in the form of dashboards. These dashboards shall display information on how well the operations and maintenance of the buildings are being performed. These dashboards shall be customised and provide

various levels of information depending on the audience (building operators, building O&M service providers, property managers, subject area experts, occupants etc.).

Information displayed shall include:

A. Anomaly correction history;
B. Current open anomaly corrections(by priority and by cost/savings);
C. Energy consumption (compared to baseline, normalised to weather) in absolute values and as a ratio compared to baseline;
D. Energy and GHG savings per period (e.g. annual, since a specific date) in absolute values and as a ratio compared to baseline;
E. Anomaly correction priority (according to estimated targeted savings as described in Section 2.8);
F. Operations and Maintenance events occurring in the building; and
G. Weather information

Information displayed shall be kept up to date and updated with frequency of not less than once per hour.

2.10 Building Maintenance Service Performance Monitoring

The solution shall provide measures to monitor and track the performance of building O&M service providers related to following KPIs (key performance indicators):

A. An inventory of all equipment under coverage of the contract resulting from this RFP;
B. Records of every anomaly correction/recommendation issued during the term of the contract;
C. Service request (or anomaly correction) data, including time stamps for receipt of service requests and completion of service requests; and
D. Service request frequency, time to request acknowledgment, and time to service completion.

The solution shall be capable of generating reports on the KPIs by base, an individual building or by type of anomaly correction/recommendation (preventive maintenance, emergency service, etc.).

The service performance information shall be captured electronically and stored in an electronic data repository for the term of any contract resulting from this SoR. NRC and DND personnel with proper credentials shall have real time access to this service performance information through an Internet portal by use of a web browser. The access shall include the capability for NRC and DND to download the data for use in other internal data systems.

2.11 Reporting

A summary of energy consumption, trends and analysis, building optimisation recommendations and any additional recommendations and inferences shall be provided in monthly reports. All data shall be available in non-proprietary formats (.csv, .xls and .ascii at a minimum).

2.12 System Availability, Scalability, and Interoperability
The solution shall:

A. Have availability at least 99% during building operating hours and at least 95% during other periods;
B. Be scalable to monitor additional devices and meters, integrate additional sensors, and deploy to additional buildings as needed; and
C. Allow integration with other existing open systems or third party applications.

2.13 System Security, Privacy, and Data Sovereignty
The solution shall:

A. Provide security and protection measures in compliance with DND's security and privacy policies.
B. Ensure all data collected from DND buildings are stored and maintained within the territory of Canada.

2.14 Ownership and Retention of Collected Data
All data collected from DND buildings remains DND's property.

The bidder shall retain all data collected from DND buildings for the length of the contract and make the data available to NRC and DND at the end of the contract in an electronic (machine readable) form, including a complete description of the collected data.

2.15 Turnkey Solution
The selected Bidder will be completely responsible for providing to DND a turnkey solution that is appropriately commissioned and operational. This shall include all coordination with NRC and DND, site coordination, electrical installations, network wiring or cellular communication setup, energy meters integration as needed, testing signal strengths, system configuration, etc. The selected Bidder shall establish and ensure stable connectivity between the existing BAS and the selected Bidder's platform.

Provide and install electrical power within up to 100' of the new panel. Provide and install BACnet router within up to 100' from existing network connection. Provide and install wireless connection antenna within 100' of the new panel.

Unless requested in writing by DND, all installation must be completed during regular working hours. Building systems and equipment shall not be shut down at any time.

2.16 System Maintenance
The selected Bidder shall ensure that the installed system is of the most current version and provide the on-going maintenance of the installed system for the duration of the contract. If the selected Bidder collects a monthly or annual maintenance/service fee, the cost of periodical upgrades of the system shall be included in that fee.

2.17 Training

The selected Bidder must provide and arrange for all necessary training of facility managers and operating staff to ensure the proper operation of the solution, to impart the necessary skills to operate the systems efficiently.

2.18 Security Clearance

For all employees of the Bidder and employees of the Bidder's subcontractors, the Bidder shall submit, as part of the bid package, proof of reliability status security clearance.

For the Bidder's organization and all of the Bidder's subcontractors, the Bidder shall submit, as part of the bid package, a valid Designated Organization Screening (DOS).

The selected Bidder must, at all times during the performance of the Contract, hold a valid Designated Organization Screening (DOS), issued by the Canadian Industrial Security Direc-torate (CISD), Public Works and Government Services Canada (PWGSC).

1. All personnel, including sub-contractors, requiring access to the work site(s) must EACH hold a valid RELIABILITY STATUS, granted or approved by CISD/PWGSC.
2. The Bidder must comply with the provisions of the:
    a) Security Requirements Check List (SRCL) and security classification guide (if applicable);
    b) Industrial Security Manual (Latest Edition).

2.19 Health & Safety

The Bidder shall submit, as part of the bid package, a copy of the following mandatory Health & Safety documents that will govern the Health & Safety practices of their employees and the employees of their subcontractors:

A. Signed and dated:
    a. Health & Safety policy statement
    b. The project specific Health & Safety program that supports the policy
    c. Violence and harassment policies
    d. "Right to Refuse Work" procedures
B. Trade qualifications and applicable certificates (worker/supervisor H&S training and awareness)
C. Hazard Assessment/Analysis template (task, hazard, control measure)
D. Signed and dated acknowledgement that the bidder understands the site work will be completed in DND buildings, which may require the submission of additional Health and Safety related documentation, depending on the building location and type of occupancy.

Before commencing site work, host a Health and Safety startup meeting at all sites with the DND on-site representative and sub-contractors. The meeting shall meet the requirements of the Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

2.20 Coordination and Schedule

A. The selected Bidder shall coordinate site access with DND's local building authority, and provide all requested documentation required for access, in accordance with the policies and procedures defined by that authority.
B. The selected Bidder shall provide a detailed work plan and schedule to NRC for review and comment within five working days of award.
C. The selected Bidder must be capable of conducting site visits for troubling shooting and repair within 24 hours of learning that the data acquisition system is malfunctioning.
D. The selected Bidder shall assign a Project Manager to coordinate work with all project partners and to manage the installation and integration of the Bidder's work. The Project Manager shall be the main point of contact with NRC. The Project Manager shall organize and host weekly video conference meetings, using WebEx, with all project partners. The Project Manager shall send meeting minutes after every weekly meeting. The Project Manager shall submit an updated schedule to NRC every week showing a breakdown of every building and sub-tasks for the installation, including completion dates for each sub-task.

3. Contents of the Proposal

Proposals shall include information pertaining to this section. This information will be used to evaluate the solution from both technical and financial aspects.

3.1 Mandatory Requirement Checklist

Each Bidder is required to complete the mandatory requirement checklist as shown in Appendix C and insert it at the beginning of the Bidder's proposal.

3.2 Installation

The Bidder shall:

A. Describe the installation requirements of Bidder's product(s); this shall include, but not limited to, additional pieces of equipment required to achieve desired results from the system (e.g. additional sensors or gateways).
B. Describe conditions of the building system, if any, required prior to and during installation of Bidder's product(s).
C. Describe, if Bidder will self-install or subcontract the installation and wiring of Bidder's system and how the installers will be qualified.
D. Describe what, in Bidder's experience, has been the best approach in coordination with project subcontractors to ensure a successful installation.
E. Provide a proposed schedule to complete the installation, including major milestones.
F. Provide a deployment plan based on building type and location, and on the BAS and meters' type to demonstrate the ability of delivering the required number of building installations in the allotted time.

3.3 Platform

The Bidder shall:

A. Describe what FDD and/or analytics services are performed by Bidder's staff, and which services are provided by 3rd party suppliers under Bidder's supervision.
B. Provide names and manufacturers of any products that Bidder will be presenting in the response to the RFP.
C. Describe, if Bidder's Solution is hardware, software, service or a combination of the above.
D. Describe details of Bidder's solution and key benefits.
E. List exclusions related to Bidder's product, if any.

3.4 Network and Integration

The Bidder shall be capable of working using DND approved connectivity methods in retrieving data from the building systems. The Bidder shall:

A. Provide description of integration methodology between building BAS and metering systems and Bidder's proposed system.
B. Provide detail of network connectivity options available to integrate systems.
C. Provide description of security measures used to ensure security of the connectivity used.
D. The solution must be capable of integrating with the BAS systems used by DND in order to retrieve data from the building systems. Following is the minimum list of the systems/products/installers with which the solution must be able to integrate:
    a. Alerton
    b. Andover
    c. Automated Logic
    d. Delta
    e. Honeywell
    f. Johnson Controls
    g. Metasys
    h. R.E.L. Controls
    i. Reliable Controls
    j. Schneider Electric
    k. Siemens
    l. Trane
    m. VCI
    n. Walker

3.5 Operations
The Bidder shall:

A. Provide a detailed description of how requirements contained in this SoR will be met.
B. Describe the service operation capacity of the organization including service call dispatch operations, service call communications with technical personnel, and internal process controls designed to ensure timely and closed loop performance.
C. Provide documentation of licenses and certifications as may be required during the completion of the requirements contained in this SoR; and
D. Provide an information flow chart showing how the proposed solution integrates with existing systems and data sources and how the collected data are backed-up

3.6 System Maintenance
The Bidder shall:

A. Describe any special equipment and techniques that are recommended or required for appropriate maintenance of the Bidder's system.
B. Provide information on Bidder-provided initial training to building operation and maintenance staff for the proper maintenance of the system.

3.7 Analytics - Fault Detection and Diagnostics (FDD)
The Bidder shall:

A. Describe how the analytics platform performs fault detection and diagnostics.
B. Describe what variables are considered in carrying out diagnostics.
C. Describe the level of automation of this system, vs. how much is manual.
D. Describe if Bidder carries out Equipment Performance Analysis and recommendations for continuous commissioning.

3.8 Anomaly Correction Integration
The Bidder shall provide details regarding Bidder's system's capability to dispatch anomaly corrections for specific issues at the equipment and/or device level. This will include the ability to identify the issue through rule-based engines and analytics, document what was discovered, provide clear, detailed, actionable advice to DND facility management teams and the service providers, and track the results of their actions over time.

3.9 Command Centre Operations
The Bidders shall:

A. Provide 24/7 technical support with subject matter experts. Provide details regarding any command and control centers that are utilized with Bidder's solution.
B. Demonstrate the readiness of the Bidder to provide the services as required (e.g. facilities and personnel already in place).

3.10 Service Level Agreements and Key Performance Indicators

Bidders shall provide the description of the service levels that will be maintained and indicate the Key Performance Indicators they will commit and adhere to.

3.11 Measurement and Verification

The Bidder shall:

A. Describe the process by which Bidder will verify and report on savings achieved.
B. Describe Bidder's ability to measure and present data reports, with respect to consumption, equipment performance, building comfort etc.; a sample report should be provided.
C. The Bidder shall provide the rationale and methods used to demonstrate how targeted savings are determined.

3.12 Energy Analysis

The Bidder shall:

A. Provide details with respect to the type of energy analysis that is carried out and reports produced.
B. Describe the methodology to identify anomalies /deviations and report those anomalies / deviations to nominated stakeholders at DND.
C. Describe Bidder's practices with respect to making recommendations to DND for any enhancement / changes.

3.13 Service and Quality

The Bidder shall:

A. Provide information on Bidder's standard response time to customer requests. Describe methods of communication (by phone, by e-mail, etc.).
B. Describe how Bidder handles customer complaints.
C. Describe how Bidder measures service levels and product quality.

3.14 System Architecture

The Bidder shall:

A. Provide the full details of how Bidder's system will integrate with the building BAS and metering systems at each site, and detail what support Bidder's system will require at each site.
B. Describe how the building data provided by DND will need to be configured and passed to Bidder's system at each site.
C. Provide details of the Bidder's network architecture showing how the system will be configured so that it is completely separate and segregated from any DND networks. Describe in detail how the network will provide resilient and effective communication links.

3.15 Additional Services

The Bidder shall describe its capabilities with respect to developing customized analytics, and dashboards upon DND request.

3.16 Company Information, Personnel and References

The Bidder shall:

A. Provide a brief history of the Bidder and relevant experience providing the services required in the RFP and the optional services and capabilities declared above.
B. Provide detailed information and qualification information regarding personnel to be assigned to this agreement including resumes and certifications.
C. List all software tools and diagnostic equipment that the Bidder utilizes to service the existing direct digital control and automation systems.
D. Provide an organizational chart for the Bidder including the personnel to be assigned to this account.
E. Provide description of three projects that the company completed using the proposed solution within the last five years. Each project description shall include:
    - Name of the client (including reference contacts should NRC or DND wish to contact them);
    - Brief description of the scope of the project;
    - Total cost of the project;
    - Number of assets (buildings) included in the project;
    - Total area of the assets (buildings) managed under the contract (m2);
    - Savings realized after implementation of the system;
    - Names of the project manager and the key personnel involved in implementation of the solution, including their roles and responsibilities;
    - Dates, when the project was implemented.

4. Additional Information

This section provides additional information.

A. There will be no site visits as part of the RFP process.
B. Consortiums and joint ventures can submit a proposal. The proposals must clearly define the role and responsibilities of all parties involved, as well as the lead party that will be the main contact for NRC and DND. Bids must be submitted by the leading organization.
C. For the purpose of the bid, assume that all BASs are BACnet compliant.
D. For the purpose of the bid, assume that energy metering data are available either at the BAS or at a centralized server.
E. There will be no existing Internet connection to be used at the sites. There will be no connection to any existing IT networks. The connection between the BAS and the selected Bidder's platform is the responsibility of the selected Bidder
F. The selected Bidder must provide an electrician for related electrical work.
G. There are no existing anomaly correction management systems available at the buildings to be used as part of the Bidder's solution.
H. Refer to the List of Potential Buildings for work locations and call-up list.

Appendix “B” – List of Buildings and Potential Buildings

National Defence / Défense nationale

DND Smart Building Pilot 2017/18

Base	Building	Type	Built (approximate)	Clearance	Gross Floor Area (m2)	Vendor/MFG	BAS			Environmental Cert.
							Number of Points	Remotely Monitored	On Other Network	
8 Wing - Trenton	B575 - Hangar 1	Aircraft Hangar	2012	Reliable	18,500	Automated Logic	5,000	No	No	Designed LEED Silver
8 Wing - Trenton	B605 - TEME	Large Vehicle repair garage	2012	Reliable	17,000	Johnson Controls	5,000	Yes	No	Designed LEED Silver
8 Wing - Trenton	B607 - Hangar 2	Aircraft Hangar	2013	Reliable	11,582	Reliable Controls	5,000	Yes	Yes	Cert. LEED Gold

List of Potential Buildings:

The following list of buildings is defined as the “call-up” list. The initial work under this RFP is for the 3 buildings identified as “Primary” buildings. The price provided as part of this bid submission shall include the 3 primary buildings only.

1) **Trenton:**
    a. B575 – Primary Building
    b. B605 – Primary Building
    c. B607 – Primary Building
    d. Édifice Sedley S. Blanchard Building
    e. Maintenance Hangar 6
    f. Trainee Quarters CFB Trenton, Ontario

2) **Kingston:**
    a. All Ranks Dining Hall, CFB Kingston
    b. Maintenance / Office Building
    c. New Office / Maintenance Building
    d. Peace Support Training Centre
    e. Trainee Quarters CFB Kingston, Ontario
    f. Vimy Trainee Quarters, CFB Kingston

NRC and DND may identify additional buildings from the call-up list under separate amendments or contracts. NRC and DND may identify buildings from the call-up list for deployment of stream-lined data solutions. The scope of streamlined solutions would be defined at the time they are needed.

Appendix C: Mandatory and Rated Requirements Checklist

1. Mandatory Requirement Checklist

In order to receive consideration by NRC and DND, all proposals must respond to the following mandatory requirements and must include the referenced Section/Page in Bidder's proposal. Any proposal that fails to indicate clearly that all mandatory requirements have been met will receive no further consideration.

	Reference to Statement of Work	Mandatory Requirements	Compliant (Yes/No)	Referenced Section/ Page in Bidder's Proposal
1.1		Access through Web services for 3rd party applications to retrieve energy data and work order data		
1.2	2.1	General		
1.3	2.2	Components and services		
1.4	2.3	Data collection from BAS in 1-minute intervals		
1.5	2.4	Energy meter data collection in 15-minute intervals		
1.6	2.5	Work orders generated based on outputs of the FDD system		
1.7	2.5	Subject Matter Expert review of anomalies and/or flags		
1.8	2.5	Fault detection & diagnostics (FDD) as defined in Statement of Requirements, Section 2.5		
1.9	2.6	Capability of building optimization including but not limited to operation sequences, set-points, etc. but without direct changes to BAS		
1.10	2.6	Capability of continuous commissioning		
1.11	2.7	User interfaces as defined in Statement of Requirements, Section 2.7		
1.12	2.8	Savings estimation on work orders or recommended actions		
1.13	2.9	Manager dashboards & operator dashboards		
1.14	2.9	Work orders prioritized according to their impacts		
1.15	2.10	Capability of monitoring building maintenance service provider's performance		
1.16	2.11	Reporting		
1.17	2.12	Minimum system availability: 99% during operating hours and		
1.18	2.12	Scalability to additional buildings		
1.19	2.13	Collected data stored and maintained in Canada		
1.20	2.14	Ownership and retention of collected data		
1.21	2.15	Turnkey solution		
1.22	2.15	FDD system configured and updated, as required, by the vendor, without support from PSPC		
1.23	2.16	Hardware and software updates covered under the annual fee		
1.24	2.18	Refer to SoR for mandatory security requirements.		
1.25	2.19	Refer to SoR for mandatory Health & Safety requirements		

1.26	2.20	Selected Bidder shall be ready to provide the services as required (i.e. facilities and personnel already in place). The Bidder shall confirm that they have adequate staff available for the duration of the contract to ensure all work is complete and issues resolved in such a way that the installations are complete and data is being received by March 2nd, 2018. Assume that the contract will be awarded by January 8th, 2018. The Bidder shall submit a proposed schedule with their bid. The Bidder shall confirm that they are capable of conducting site visits for troubling shooting and repair within 24 hours of learning that the data acquisition system is malfunctioning.		
1.27	RFP Section 7.0	A fixed price including a full cost breakdown and hourly rates of all staff categories		

2. Rated Requirements

Proposals achieving 85 or higher technical points and the minimum points for each individual technical requirement will then be evaluated on financial information and price.

In order to qualify for the rating process, proposals must respond to the following rated requirements and must include the referenced Section/Page in the Bidder's proposal.

	Rated Technical Requirements	Points		Referenced Section/ Page in Bidder's Proposal
		Max.	**Min.**	
2.1	Data collection including BAS data and energy data, and data sovereignty	15	10	
2.2	Building data analytics, fault detection and diagnosis	20	12	
2.3	Dashboards / user interfaces	15	8	
2.4	System installation, integration, and connectivity	15	8	
2.5	System scalability, interoperability, and APIs	10	5	
2.6	Monitoring of maintenance service providers' performance	10	5	
2.7	Continuous commissioning and building optimization	5	3	
2.8	Savings calculation capability	5	3	
2.9	Content and quality of reporting	5	3	
2.10	Corporate expertise & experience	10	5	
2.11	Implementation schedule and milestones	5	3	
2.12	Service levels and KPIs as proposed by the Bidder	5	3	
2.13	Customer service	5	3	
	TOTAL TECHNICAL POINTS:	**125**	**85**	

APPENDIX D

EVALUATION TEAM – SCORING

Evaluate criterion based on the comparison of each submission against an absolute scale rating of 0 to 10 (10 for superior to 0 points for 'did not submit information'). Consider the following table in order for each evaluation team member to share a common understanding of the evaluation scale.

SAMPLE

NON RESPONSIVE	VERY POOR	WEAK	AVERAGE	SUPERIOR
0 points	**1 – 2 point**	**3 – 5 points**	**6 – 8 points**	**9 – 10 points**
▪ Did not submit information which could be evaluated	▪ Does not meet the requirement ▪ Weaknesses can't be corrected ▪ Proponent lacks qualifications and experience ▪ Team proposed is not likely able to meet requirements ▪ Sample projects not related to this project's needs ▪ Unacceptable	▪ Lacks details ▪ Weaknesses can be corrected ▪ Proponent generally lacks qualifications and experience ▪ Team is weak – either missing component or overall experience is weak ▪ Sample projects generally not related to this project's need ▪ Little capability to meet performance requirements	▪ Satisfies requirement ▪ No significant weaknesses ▪ Proponent is qualified and experienced ▪ Team covers all components and will likely meet requirements ▪ Sample projects generally related to this project's needs ▪ Average capability, should be adequate for effective results	▪ More than satisfies requirement ▪ No apparent weaknesses ▪ Proponent is well qualified and experienced ▪ Strong team – some members have previously worked together ▪ Sample projects directly related to this project's needs ▪ Superior capability, should ensure effective results

ID	**2035**
Title	**General Conditions - Services**
Date	**2011-05-16**
Status	**Active**

01 Interpretation
02 Powers of Canada
03 Status of the Contractor
04 Conduct of the Work
05 Subcontracts
06 Specifications
07 Replacement of Specific Individuals
08 Time of the Essence
09 Excusable Delay
10 Inspection and Acceptance of the Work
11 Invoice Submission
12 Taxes
13 Transportation Costs
14 Transportation Carriers' Liability
15 Payment Period
16 Interest on Overdue Accounts
17 Compliance with Applicable Laws
18 Ownership
19 Copyright
20 Translation of Documentation
21 Confidentiality
22 Government Property
23 Liability
24 Intellectual Property Infringement and Royalties
25 Amendment and Waivers
26 Assignment
27 Suspension of the Work
28 Default by the Contractor
29 Termination for Convenience
30 Accounts and Audit
31 Right of Set-off
32 Notice
33 Conflict of Interest and Values and Ethics Codes for the Public Service
34 No Bribe or Conflict
35 Survival
36 Severability
37 Successors and Assigns
38 Contingency Fees
39 International Sanctions
40 Harassment in the Workplace
41 Entire Agreement

2035 01 (2008-05-12) Interpretation

In the Contract, unless the context otherwise requires:

"Articles of Agreement" means the clauses and conditions incorporated in full text to form the body of the Contract; it does not include these general conditions, any supplemental general conditions, annexes, the Contractor's bid or any other document;

"Canada", "Crown", "Her Majesty" or "the Government" means Her Majesty the Queen in right of Canada as represented by the National Research Council of Canada and any other person duly authorized to act on behalf of the National Research Council Canada.

"Contract" means the Articles of Agreement, these general conditions, any supplemental general conditions, annexes and any other document specified or referred to as forming part of the Contract, all as amended by agreement of the Parties from time to time;

"Contracting Authority" means the person designated by that title in the Contract, or by notice to the Contractor, to act as Canada's representative to manage the Contract;

"Contractor" means the person, entity or entities named in the Contract to supply goods, services or both to Canada;

"Contract Price" means the amount stated in the Contract to be payable to the Contractor for the Work, exclusive of Goods and Services Tax and Harmonized Sales Tax;

"Government Property" means anything supplied to the Contractor by or on behalf of Canada for the purposes of performing the Contract and anything acquired by the Contractor in any manner in connection with the Work, the cost of which is paid by Canada under the Contract;

"Party" means Canada, the Contractor, or any other signatory to the Contract and "Parties" means all of them;

"Specifications" means the description of the essential, functional or technical requirements of the Work in the Contract, including the procedures for determining whether the requirements have been met;

"Work" means all the activities, services, goods, equipment, matters and things required to be done, delivered or performed by the Contractor under the Contract.

2035 02 (2008-05-12) Powers of Canada

All rights, remedies, powers and discretions granted or acquired by Canada under the Contract or by law are cumulative, not exclusive.

2035 03 (2008-05-12) Status of the Contractor

The Contractor is an independent contractor engaged by Canada to perform the Work. Nothing in the Contract is intended to create a partnership, a joint venture or an agency between Canada and the other Party or Parties. The Contractor must not represent itself as an agent or representative of Canada to anyone. Neither the Contractor nor any of its personnel is engaged as an employee or agent of Canada. The Contractor is responsible for all deductions and remittances required by law in relation to its employees.

2035 04 (2008-05-12) Conduct of the Work

1. The Contractor represents and warrants that:

   (a) it is competent to perform the Work;

   (b) it has everything necessary to perform the Work, including the resources, facilities, labour, technology, equipment, and materials; and

(c) it has the necessary qualifications, including knowledge, skill, know-how and experience, and the ability to use them effectively to perform the Work.

2. The Contractor must:

(a) perform the Work diligently and efficiently;

(b) except for Government Property, supply everything necessary to perform the Work;

(c) use, as a minimum, quality assurance procedures, inspections and controls generally used and recognized by the industry to ensure the degree of quality required by the Contract;

(d) select and employ a sufficient number of qualified people;

(e) perform the Work in accordance with standards of quality acceptable to Canada and in full conformity with the Specifications and all the requirements of the Contract;

(f) provide effective and efficient supervision to ensure that the quality of workmanship meets the requirements of the Contract.

3. The Work must not be performed by any person who, in the opinion of Canada, is incompetent, unsuitable or has been conducting himself/herself improperly.

4. All services rendered under the Contract must, at the time of acceptance, be free from defects in workmanship and conform to the requirements of the Contract. If the Contractor is required to correct or replace the Work or any part of the Work, it will be at no cost to Canada.

5. Canada's facilities, equipment and personnel are not available to the Contractor to perform the Work unless the Contract specifically provides for it. The Contractor is responsible for advising the Contracting Authority in advance if it requires access to Canada's facilities, equipment or personnel to perform the Work. The Contractor must comply and ensure that its employees and subcontractors comply with all security measures, standing orders, policies or other rules in force at the site where the Work is performed.

6. Unless the Contracting Authority orders the Contractor to suspend the Work or part of the Work pursuant to section 27, the Contractor must not stop or suspend the Work or part of the Work pending the settlement of any dispute between the Parties about the Contract.

7. The Contractor must provide all reports that are required by the Contract and any other information that Canada may reasonably require from time to time.

8. The Contractor is fully responsible for performing the Work. Canada will not be responsible for any negative consequences or extra costs if the Contractor follows any advice given by Canada unless the Contracting Authority provides the advice to the Contractor in writing and includes a statement specifically relieving the Contractor of any responsibility for negative consequences or extra costs that might result from following the advice.

2035 05 (2010-01-11) Subcontracts

1. Except as provided in subsection 2, the Contractor must obtain the Contracting Authority's written consent before subcontracting or permitting the subcontracting of any part of the Work. A subcontract includes a contract entered into by any subcontractor at any tier to perform any part of the Work.

2. The Contractor is not required to obtain consent for subcontracts specifically authorized in the Contract. The Contractor may also without the consent of the Contracting Authority:

(a) purchase "off-the-shelf" items and any standard articles and materials that are ordinarily produced by manufacturers in the normal course of business;

(b) subcontract any portion of the Work as is customary in the carrying out of similar contracts; and;

(c) permit its subcontractors at any tier to make purchases or subcontract as permitted in paragraphs (a) and (b).

3. In any subcontract other than a subcontract referred to in paragraph 2.(a), the Contractor must, unless the Contracting Authority agrees in writing, ensure that the subcontractor is bound by conditions compatible with and, in the opinion of the Contracting Authority, not less favourable to Canada than the conditions of the Contract.

4. Even if Canada consents to a subcontract, the Contractor is responsible for performing the Contract and Canada is not responsible to any subcontractor. The Contractor is responsible for any matters or things done or provided by any subcontractor under the Contract and for paying any subcontractors for any part of the Work they perform.

2035 06 (2008-05-12) Specifications

1. Specifications provided by Canada or on behalf of Canada to the Contractor in connection with the Contract belong to Canada and must be used by the Contractor only for the purpose of performing the Work.

2. If the Contract provides that Specifications furnished by the Contractor must be approved by Canada, that approval will not relieve the Contractor of its responsibility to meet all requirements of the Contract.

2035 07 (2008-05-12) Replacement of Specific Individuals

1. If specific individuals are identified in the Contract to perform the Work, the Contractor must provide the services of those individuals unless the Contractor is unable to do so for reasons beyond its control.

2. If the Contractor is unable to provide the services of any specific individual identified in the Contract, it must provide a replacement with similar qualifications and experience. The replacement must meet the criteria used in the selection of the Contractor and be acceptable to Canada. The Contractor must, as soon as possible, give notice to the Contracting Authority of the reason for replacing the individual and provide:

   (a) the name, qualifications and experience of the proposed replacement; and

   (b) proof that the proposed replacement has the required security clearance granted by Canada, if applicable.

3. The Contractor must not, in any event, allow performance of the Work by unauthorized replacement persons. The Contracting Authority may order that a replacement stop performing the Work. In such a case, the Contractor must immediately comply with the order and secure a further replacement in accordance with subsection 2. The fact that the Contracting Authority does not order that a replacement stop performing the Work does not relieve the Contractor from it’s responsibility to meet the requirements of the Contract.

2035 08 (2008-05-12) Time of the Essence

It is essential that the Work be performed within or at the time stated in the Contract.

2035 09 (2008-05-12) Excusable Delay

1. A delay in the performance by the Contractor of any obligation under the Contract that is caused by an event that

   (a) is beyond the reasonable control of the Contractor,

   (b) could not reasonably have been foreseen,

   (c) could not reasonably have been prevented by means reasonably available to the Contractor, and

   (d) occurred without the fault or neglect of the Contractor,

will be considered an "Excusable Delay" if the Contractor advises the Contracting Authority of the occurrence of the delay or of the likelihood of the delay as soon as the Contractor becomes aware of it. The Contractor must also advise the Contracting Authority, within fifteen (15) working days, of all the circumstances relating to the delay and provide to the Contracting Authority for approval a clear work around plan explaining in detail the steps that the Contractor proposes to take in order to minimize the impact of the event causing the delay.

2. Any delivery date or other date that is directly affected by an Excusable Delay will be postponed for a reasonable time that will not exceed the duration of the Excusable Delay.

3. However, if an Excusable Delay has continued for thirty (30) days or more, the Contracting Authority may, by giving notice in writing to the Contractor, terminate the Contract. In such a case, the Parties agree that neither will make any claim against the other for damages, costs, expected profits or any other loss arising out of the termination or the event that contributed to the Excusable Delay. The Contractor agrees to repay immediately to Canada the portion of any advance payment that is unliquidated at the date of the termination.

4. Unless Canada has caused the delay by failing to meet an obligation under the Contract, Canada will not be responsible for any costs incurred by the Contractor or any of its subcontractors or agents as a result of an Excusable Delay.

5. If the Contract is terminated under this section, the Contracting Authority may require the Contractor to deliver to Canada, in the manner and to the extent directed by the Contracting Authority, any completed parts of the Work not delivered and accepted before the termination and anything that the Contractor has acquired or produced specifically to perform the Contract. Canada will pay the Contractor:

   (a) the value, of all completed parts of the Work delivered to and accepted by Canada, based on the Contract Price, including the proportionate part of the Contractor's profit or fee included in the Contract Price; and

   (b) the Cost to the Contractor that Canada considers reasonable in respect of anything else delivered to and accepted by Canada.

The total amount paid by Canada under the Contract to the date of termination and any amounts payable under this subsection must not exceed the Contract Price.

2035 10 (2008-05-12) Inspection and Acceptance of the Work

1. All the Work is subject to inspection and acceptance by Canada. Inspection and acceptance of the Work by Canada do not relieve the Contractor of its responsibility for defects or other failures to meet the requirements of the Contract. Canada will have the right to reject any Work that is not in accordance with the requirements of the Contract and require its correction or replacement at the Contractor's expense.

2. The Contractor must provide representatives of Canada access to all locations where any part of the Work is being performed at any time during working hours. Representatives of Canada may make examinations and such tests of the Work as they may think fit. The Contractor must provide all assistance and facilities, test pieces, samples and documentation that the representatives of Canada may reasonably require for the carrying out of the inspection. The Contractor must forward such test pieces and samples to such person or location as Canada specifies.

3. The Contractor must inspect and approve any part of the Work before submitting it for acceptance or delivering it to Canada. The Contractor must keep accurate and complete inspection records that must be made available to Canada on request. Representatives of Canada may make copies and take extracts of the records during the performance of the Contract and for up to three (3) years after the end of the Contract.

2035 11 (2008-05-12) Invoice Submission

1. Invoices must be submitted in the Contractor's name. The Contractor must submit invoices for each delivery or shipment; invoices must only apply to the Contract. Each invoice must indicate whether it covers partial or final delivery.

2. Invoices must show:

   (a) the date, the name and address of the client, item or reference numbers, deliverable and/or description of the Work, contract number, GST/HST number;

   (b) details of expenditures in accordance with the Basis of Payment, exclusive of Goods and Services Tax (GST) or Harmonized Sales Tax (HST) (such as item, quantity, unit of issue, unit price, fixed time labour rates and level of effort, subcontracts, as applicable);

   (c) deduction for holdback, if applicable;

   (d) the extension of the totals, if applicable; and

   (e) if applicable, the method of shipment together with date, case numbers and part or reference numbers, shipment charges and any other additional charges.

3. If applicable, the GST or HST must be specified on all invoices as a separate item. All items that are zero-rated, exempt or to which the GST or HST does not apply, must be identified as such on all invoices.

4. By submitting an invoice, the Contractor certifies that the invoice is consistent with the Work delivered and is in accordance with the Contract.

2035 12 (2010-08-16) Taxes

1. Municipal Taxes

   Municipal Taxes do not apply.

2. Provincial Taxes

   (a) Excluding legislated exceptions, federal government departments and agencies are not required to pay any sales tax payable to the province in which the taxable goods or services are delivered. This exemption has been provided to federal government departments and agencies under the authority of one of the following:

      (i) Provincial Sales Tax (PST) Exemption Licence Numbers, for the provinces of:
      Prince Edward Island OP-10000-250
      Manitoba 390-516-0

      (ii) for Quebec, Saskatchewan, the Yukon Territory, the Northwest Territories and Nunavut, an Exemption Certification, which certifies that the goods or services purchased are not subject to the provincial/territorial sales and consumption taxes because they are purchased by the federal government with Canada funds for the use of the federal government.

   (b) Currently, in Alberta, the Yukon Territory, the Northwest Territories and Nunavut, there is no general PST. However, if a PST is introduced in Alberta, the Yukon Territory, the Northwest Territories or Nunavut, the sales tax exemption certificate would be required on the purchasing document.

   (c) Federal departments must pay the HST in the participating provinces of Newfoundland and Labrador, Nova Scotia, New Brunswick, Ontario and British Columbia.

   (d) The Contractor is not exempt from paying PST under the above Exemption Licence Numbers or Exemption Certification. The Contractor must pay the PST on taxable goods or services used or consumed in the performance of the Contract (in accordance with applicable provincial legislation), including material incorporated into real property.

3. Changes to Taxes and Duties

   If there is any change to any tax or duty payable to any level of government in Canada after the bid submission date that affects the costs of the Work to the Contractor, the Contract Price will be adjusted to reflect the increase or decrease in the cost to the Contractor. However, there will be no adjustment for any change that increases the cost of the Work to the Contractor if public notice of the change was given before bid submission date in sufficient detail to have permitted the Contractor to calculate the effect of the change on its cost. There will be no adjustment if the change takes effect after the date required by the Contract for delivery of the Work.

4. GST or HST

   The estimated GST or HST, if applicable, is included in the total estimated cost on page 1 of the Contract. The GST or HST is not included in the Contract Price but will be paid by Canada as provided in the Invoice Submission section above. The Contractor agrees to remit to Canada Revenue Agency any amounts of GST and HST paid or due.

5. Tax Withholding of 15 Percent

   Pursuant to the *Income Tax Act*, 1985, c. 1 (5th Supp.) and the *Income Tax Regulations*, Canada must withhold 15 percent of the amount to be paid to the Contractor in respect of services provided in Canada if the Contractor is a non-resident unless the Contractor obtains a valid waiver. The amount withheld will be held on account for the Contractor in respect to any tax liability which may be owed to Canada.

2035 13 (2010-01-11) Transportation Costs

If transportation costs are payable by Canada under the Contract and the Contractor makes the transportation arrangements, shipments must be made by the most direct and economical means consistent with normal shipping practice. The costs must be shown as a separate item on the invoice.

2035 14 (2010-01-11) Transportation Carriers' Liability

The federal government's policy of underwriting its own risks precludes payment of insurance or valuation charges for transportation beyond the point at which ownership of goods passes to the federal government (determined by the FOB point or Incoterms). Where increased carrier liability is available without charge, the Contractor must obtain the increased liability for shipment.

2035 15 (2008-05-12) Payment Period

1. Canada's standard payment period is thirty (30) days. The payment period is measured from the date an invoice in acceptable form and content is received in accordance with the Contract or the date the Work is delivered in acceptable condition as required in the Contract, whichever is later. A payment is considered overdue on the 31st day following that date and interest will be paid automatically in accordance with the section 16.

2. If the content of the invoice and its substantiating documentation are not in accordance with the Contract or the Work is not in acceptable condition, Canada will notify the Contractor within fifteen (15) days of receipt. The 30-day payment period begins upon receipt of the revised invoice or the replacement or corrected Work. Failure by Canada to notify the Contractor within fifteen (15) days will only result in the date specified in subsection 1 to apply for the sole purpose of calculating interest on overdue accounts.

2035 16 (2008-12-12) Interest on Overdue Accounts

1. For the purpose of this section:

   "Average Rate" means the simple arithmetic mean of the Bank Rates in effect at 4:00 p.m. Eastern Time each day during the calendar month immediately before the calendar month in which payment is made;

"Bank Rate" means the rate of interest established from time to time by the Bank of Canada as the minimum rate at which the Bank of Canada makes short term advances to members of the Canadian Payments Association;

"date of payment" means the date of the negotiable instrument drawn by the Receiver General for Canada to pay any amount under the Contract;

an amount becomes "overdue" when it is unpaid on the first day following the day on which it is due and payable according to the Contract.

2. Canada will pay to the Contractor simple interest at the Average Rate plus 3 percent per year on any amount that is overdue, from the date that amount becomes overdue until the day before the date of payment, inclusive. The Contractor is not required to provide notice to Canada for interest to be payable.

3. Canada will pay interest in accordance with this section only if Canada is responsible for the delay in paying the Contractor. Canada will not pay interest on overdue advance payments.

2035 17 (2008-05-12) Compliance with Applicable Laws

1. The Contractor must comply with all laws applicable to the performance of the Contract. The Contractor must provide evidence of compliance with such laws to Canada at such times as Canada may reasonably request.

2. The Contractor must obtain and maintain at its own cost all permits, licenses, regulatory approvals and certificates required to perform the Work. If requested by the Contracting Authority, the Contractor must provide a copy of any required permit, license, regulatory approvals or certificate to Canada.

2035 18 (2008-05-12) Ownership

1. Unless provided otherwise in the Contract, the Work or any part of the Work belongs to Canada after delivery and acceptance by or on behalf of Canada.

2. However if any payment is made to the Contractor for or on account of any Work, either by way of progress or milestone payments, that work paid for by Canada belongs to Canada upon such payment being made. This transfer of ownership does not constitute acceptance by Canada of the Work or any part of the Work and does not relieve the Contractor of its obligation to perform the Work in accordance with the Contract.

3. Despite any transfer of ownership, the Contractor is responsible for any loss or damage to the Work or any part of the Work until it is delivered to Canada in accordance with the Contract. Even after delivery, the Contractor remains responsible for any loss or damage to any part of the Work caused by the Contractor or any subcontractor.

4. Upon transfer of ownership to the Work or any part of the Work to Canada, the Contractor must, if requested by Canada, establish to Canada's satisfaction that the title is free and clear of all claims, liens, attachments, charges or encumbrances. The Contractor must execute any conveyances and other instruments necessary to perfect the title that Canada may require.

2035 19 (2008-05-12) Copyright

In this section, "Material" means anything that is created by the Contractor as part of the Work under the Contract, that is required by the Contract to be delivered to Canada and in which copyright subsists. "Material" does not include anything created by the Contractor before the date of the Contract.

Copyright in the Material belongs to Canada and the Contractor must include the copyright symbol and either of the following notice on the Material: © Her Majesty the Queen in right of Canada (year) or © Sa Majesté la Reine du chef du Canada (année).

The Contractor must not use, copy, divulge or publish any Material except as is necessary to perform the Contract. The Contractor must execute any conveyance and other documents relating to copyright in the Material as Canada may require.

The Contractor must provide at the request of Canada a written permanent waiver of moral rights, in a form acceptable to Canada, from every author that contributed to the Material. If the Contractor is the author of the Material, the Contractor permanently waives its moral rights in the Material.

2035 20 (2008-05-12) Translation of Documentation

The Contractor agrees that Canada may translate in the other official language any documentation delivered to Canada by the Contractor that does not belong to Canada under section 20. The Contractor acknowledges that Canada owns the translation and that it is under no obligation to provide any translation to the Contractor. Canada agrees that any translation must include any copyright notice and any proprietary right notice that was part of the original. Canada acknowledges that the Contractor is not responsible for any technical errors or other problems that may arise as a result of the translation.

2035 21 (2008-05-12) Confidentiality

1. The Contractor must keep confidential all information provided to the Contractor by or on behalf of Canada in connection with the Work, including any information that is confidential or proprietary to third parties, and all information conceived, developed or produced by the Contractor as part of the Work when copyright or any other intellectual property rights in such information belongs to Canada under the Contract. The Contractor must not disclose any such information without the written permission of Canada. The Contractor may disclose to a subcontractor any information necessary to perform the subcontract as long as the subcontractor agrees to keep the information confidential and that it will be used only to perform the subcontract.

2. The Contractor agrees to use any information provided to the Contractor by or on behalf of Canada only for the purpose of the Contract. The Contractor acknowledges that all this information remains the property of Canada or the third party, as the case may be. Unless provided otherwise in the Contract, the Contractor must deliver to Canada all such information, together with every copy, draft, working paper and note that contains such information, upon completion or termination of the Contract or at such earlier time as Canada may require.

3. Subject to the *Access to Information Act*, R.S., 1985, c. A-1, and to any right of Canada under the Contract to release or disclose, Canada must not release or disclose outside the Government of Canada any information delivered to Canada under the Contract that is proprietary to the Contractor or a subcontractor.

4. The obligations of the Parties set out in this section do not apply to any information if the information:

   (a) is publicly available from a source other than the other Party; or

   (b) is or becomes known to a Party from a source other than the other Party, except any source that is known to be under an obligation to the other Party not to disclose the information; or

   (c) is developed by a Party without use of the information of the other Party.

5. Wherever possible, the Contractor must mark or identify any proprietary information delivered to Canada under the Contract as "Property of (Contractor's name), permitted Government uses defined under National Research Council Canada (NRC) Contract No. (fill in Contract Number)". Canada will not be liable for any unauthorized use or disclosure of information that could have been so marked or identified and was not.

6. If the Contract, the Work, or any information referred to in subsection 1 is identified as TOP SECRET, SECRET, CONFIDENTIAL, or PROTECTED by Canada, the Contractor must at all times take all measures reasonably necessary for the safeguarding of the material so identified, including those set out in the PWGSC Industrial Security Manual and its supplements and any other instructions issued by Canada.

7. If the Contract, the Work, or any information referred to in subsection 1 is identified as TOP SECRET, SECRET, CONFIDENTIAL, or PROTECTED, by Canada, representatives of Canada are entitled to inspect the Contractor's premises and the premises of a subcontractor at any tier for security purposes at any time during the term of the Contract. The Contractor must comply with, and ensure that any subcontractor complies with, all written instructions issued by Canada dealing with the material so identified, including any requirement that employees of the Contractor or of any subcontractor execute and deliver declarations relating to reliability screenings, security clearances and other procedures.

8. The Contractor consents in the case of a contract that has a value in excess of $10,000.00 to the public disclosure of information – other than information described in any of paragraphs 20(1)a) to (d) of the Access to Information Act – relating to the contract.

2035 22 (2008-05-12) Government Property

1. All Government Property must be used by the Contractor solely for the purpose of the Contract and remains the property of Canada. The Contractor must maintain adequate accounting records of all Government Property and, whenever feasible, mark it as being the property of Canada.

2. The Contractor must take reasonable and proper care of all Government Property while it is in its possession or subject to its control. The Contractor is responsible for any loss or damage resulting from its failure to do so other than loss or damage caused by ordinary wear and tear.

3. All Government Property, unless it is installed or incorporated in the Work, must be returned to Canada on demand. All scrap and all waste materials, articles or things that are Government Property must, unless provided otherwise in the Contract, remain the property of Canada and must be disposed of only as directed by Canada.

4. At the time of completion of the Contract, and if requested by the Contracting Authority, the Contractor must provide to Canada an inventory of all Government Property relating to the Contract.

2035 23 (2008-05-12) Liability

The Contractor is liable for any damage caused by the Contractor, its employees, subcontractors, or agents to Canada or any third party. Canada is liable for any damage caused by Canada, its employees or agents to the Contractor or any third party. The Parties agree that no limitation of liability or indemnity provision applies to the Contract unless it is specifically incorporated in full text in the Articles of Agreement. Damage includes any injury to persons (including injury resulting in death) or loss of or damage to property (including real property) caused as a result of or during the performance of the Contract.

2035 24 (2008-05-12) Intellectual Property Infringement and Royalties

1. The Contractor represents and warrants that, to the best of its knowledge, neither it nor Canada will infringe any third party's intellectual property rights in performing or using the Work, and that Canada will have no obligation to pay royalties of any kind to anyone in connection with the Work.

2. If anyone makes a claim against Canada or the Contractor concerning intellectual property infringement or royalties related to the Work, that Party agrees to notify the other Party in writing immediately. If anyone brings a claim against Canada, according to *Department of Justice Act*, R.S., 1985, c. J-2, the Attorney General of Canada must have the regulation and conduct of all litigation for or against Canada, but the Attorney General may request that the Contractor defend Canada against the claim. In either case, the Contractor agrees to participate fully in the defence and any settlement negotiations and to pay all costs, damages and legal costs incurred or payable as a result of the claim, including the amount of any settlement. Both Parties agree not to settle any claim unless the other Party first approves the settlement in writing.

3. The Contractor has no obligation regarding claims that were only made because:

   (a) Canada modified the Work or part of the Work without the Contractor's consent or used the Work or part of the Work without following a requirement of the Contract; or

(b) Canada used the Work or part of the Work with a product that the Contractor did not supply under the Contract (unless that use is described in the Contract or the manufacturer's specifications); or

(c) the Contractor used equipment, drawings, specifications or other information supplied to the Contractor by Canada (or by someone authorized by Canada); or

(d) the Contractor used a specific item of equipment or software that it obtained because of specific instructions from the Contracting Authority; however, this exception only applies if the Contractor has included the following language in its own contract with the supplier of that equipment or software: "[Supplier name] acknowledges that the purchased items will be used by the Government of Canada. If a third party claims that equipment or software supplied under this contract infringes any intellectual property right, [supplier name], if requested to do so by either [Contractor name] or Canada, will defend both [Contractor name] and Canada against that claim at its own expense and will pay all costs, damages and legal fees payable as a result of that infringement. "Obtaining this protection from the supplier is the Contractor's responsibility and, if the Contractor does not do so, it will be responsible to Canada for the claim.

4. If anyone claims that, as a result of the Work, the Contractor or Canada is infringing its intellectual property rights, the Contractor must immediately do one of the following:

(a) take whatever steps are necessary to allow Canada to continue to use the allegedly infringing part of the Work; or

(b) modify or replace the Work to avoid intellectual property infringement, while ensuring that the Work continues to meet all the requirements of the Contract; or

(c) take back the Work and refund any part of the Contract Price that Canada has already paid.

If the Contractor determines that none of these alternatives can reasonably be achieved, or if the Contractor fails to take any of these steps within a reasonable amount of time, Canada may choose either to require the Contractor to do (c), or to take whatever steps are necessary to acquire the rights to use the allegedly infringing part(s) of the Work itself, in which case the Contractor must reimburse Canada for all the costs it incurs to do so.

2035 25 (2008-05-12) Amendment and Waivers

1. To be effective, any amendment to the Contract must be done in writing by the Contracting Authority and the authorized representative of the Contractor.

2. While the Contractor may discuss any proposed modifications to the Work with other representatives of Canada, Canada will not be responsible for the cost of any modification unless it has been incorporated into the Contract in accordance with subsection 1.

3. A waiver will only be valid, binding or affect the rights of the Parties if it is made in writing by, in the case of a waiver by Canada, the Contracting Authority and, in the case of a waiver by the Contractor, the authorized representative of the Contractor.

4. The waiver by a Party of a breach of any condition of the Contract will not be treated or interpreted as a waiver of any subsequent breach and therefore will not prevent that Party from enforcing of that term or condition in the case of a subsequent breach.

2035 26 (2008-05-12) Assignment

1. The Contractor must not assign the Contract without first obtaining the written consent of the Contracting Authority. Any assignment made without that consent is void and will have no effect. The assignment will be effective upon execution of an assignment agreement signed by the Parties and the assignee.

2. Assignment of the Contract does not relieve the Contractor from any obligation under the Contract and it does not impose any liability upon Canada.

2035 27 (2008-05-12) Suspension of the Work

1. The Contracting Authority may at any time, by written notice, order the Contractor to suspend or stop the Work or part of the Work under the Contract for a period of up to one hundred eighty (180) days. The Contractor must immediately comply with any such order in a way that minimizes the cost of doing so. While such an order is in effect, the Contractor must not remove any part of the Work from any premises without first obtaining the written consent of the Contracting Authority. Within these one hundred eighty (180) days, the Contracting Authority must either cancel the order or terminate the Contract, in whole or in part, under section 28 or section 29.

2. When an order is made under subsection 1, unless the Contracting Authority terminates the Contract by reason of default by the Contractor or the Contractor abandons the Contract, the Contractor will be entitled to be paid its additional costs incurred as a result of the suspension plus a fair and reasonable profit.

3. When an order made under subsection 1 is cancelled, the Contractor must resume work in accordance with the Contract as soon as practicable. If the suspension has affected the Contractor's ability to meet any delivery date under the Contract, the date for performing the part of the Work affected by the suspension will be extended for a period equal to the period of suspension plus a period, if any, that in the opinion of the Contracting Authority, following consultation with the Contractor, is necessary for the Contractor to resume the Work. Any equitable adjustments will be made as necessary to any affected conditions of the Contract.

2035 28 (2008-05-12) Default by the Contractor

1. If the Contractor is in default in carrying out any of its obligations under the Contract, the Contracting Authority may, by giving written notice to the Contractor, terminate for default the Contract or part of the Contract. The termination will take effect immediately or at the expiration of a cure period specified in the notice, if the Contractor has not cured the default to the satisfaction of the Contracting Authority within that cure period.

2. If the Contractor becomes bankrupt or insolvent, makes an assignment for the benefit of creditors, or takes the benefit of any statute relating to bankrupt or insolvent debtors, or if a receiver is appointed under a debt instrument or a receiving order is made against the Contractor, or an order is made or a resolution passed for the dissolution, liquidation or winding-up of the Contractor, the Contracting Authority may, to the extent permitted by the laws of Canada, by giving written notice to the Contractor, immediately terminate for default the Contract or part of the Contract.

3. If Canada gives notice under subsection 1 or 2, the Contractor will have no claim for further payment except as provided in this section. The Contractor will be liable to Canada for all losses and damages suffered by Canada because of the default or occurrence upon which the notice was based, including any increase in the cost incurred by Canada in procuring the Work from another source. The Contractor agrees to repay immediately to Canada the portion of any advance payment that is unliquidated at the date of the termination.

4. Upon termination of the Contract under this section, the Contracting Authority may require the Contractor to deliver to Canada, in the manner and to the extent directed by the Contracting Authority, any completed parts of the Work, not delivered and accepted before the termination and anything the Contractor has acquired or produced specifically to perform the Contract. In such a case, subject to the deduction of any claim that Canada may have against the Contractor arising under the Contract or out of the termination, Canada will pay or credit to the Contractor:

   (a) the value, of all completed parts of the Work delivered to and accepted by Canada, based on the Contract Price, including the proportionate part of the Contractor's profit or fee included in the Contract Price; and

   (b) the cost to the Contractor that Canada considers reasonable in respect of anything else delivered to and accepted by Canada.

   The total amount paid by Canada under the Contract to the date of the termination and any amount payable under this subsection must not exceed the Contract Price.

5. Title to everything for which payment is made to the Contractor will, once payment is made, pass to Canada unless it already belongs to Canada under any other provision of the Contract.

6. If the Contract is terminated for default under subsection 1, but it is later determined that grounds did not exist for a termination for default, the notice will be considered a notice of termination for convenience issued under subsection 1 of section 29.

2035 29 (2008-05-12) Termination for Convenience

1. At any time before the completion of the Work, the Contracting Authority may, by giving notice in writing to the Contractor, terminate for convenience the Contract or part of the Contract. Once such a notice of termination for convenience is given, the Contractor must comply with the requirements of the termination notice. If the Contract is terminated in part only, the Contractor must proceed to complete any part of the Work that is not affected by the termination notice. The termination will take effect immediately or, as the case may be, at the time specified in the termination notice.

2. If a termination notice is given pursuant to subsection 1, the Contractor will be entitled to be paid, for costs that have been reasonably and properly incurred to perform the Contract to the extent that the Contractor has not already been paid or reimbursed by Canada. The Contractor will be paid:

   (a) on the basis of the Contract Price, for all completed work that is inspected and accepted in accordance with the Contract, whether completed before, or after the termination in accordance with the instructions contained in the termination notice;

   (b) the Cost to the Contractor plus a fair and reasonable profit for all work terminated by the termination notice before completion; and

   (c) all costs incidental to the termination of the Work incurred by the Contractor but not including the cost of severance payments or damages to employees whose services are no longer required, except wages that the Contractor is obligated by statute to pay.

3. Canada may reduce the payment in respect of any part of the Work, if upon inspection, it does not meet the requirements of the Contract.

4. The total of the amounts, to which the Contractor is entitled to be paid under this section, together with any amounts paid, due or becoming due to the Contractor must not exceed the Contract Price. The Contractor will have no claim for damages, compensation, loss of profit, allowance arising out of any termination notice given by Canada under this section except to the extent that this section expressly provides. The Contractor agrees to repay immediately to Canada the portion of any advance payment that is unliquidated at the date of the termination.

2035 30 (2008-05-12) Accounts and Audit

1. The Contractor must keep proper accounts and records of the cost of performing the Work and of all expenditures or commitments made by the Contractor in connection with the Work, including all invoices, receipts and vouchers. The Contractor must retain records, including bills of lading and other evidence of transportation or delivery, for all deliveries made under the Contract.

2. If the Contract includes payment for time spent by the Contractor, its employees, representatives, agents or subcontractors performing the Work, the Contractor must keep a record of the actual time spent each day by each individual performing any part of the Work.

3. Unless Canada has consented in writing to its disposal, the Contractor must retain all the information described in this section for six (6) years after it receives the final payment under the Contract, or until the settlement of all outstanding claims and disputes, whichever is later. During this time, the Contractor must make this information available for audit, inspection and examination by the representatives of Canada, who may make copies and take extracts. The Contractor must provide all reasonably required facilities for any audit and inspection and must furnish all the information as the representatives of Canada may from time to time require to perform a complete audit of the Contract.

4. The amount claimed under the contract, calculated in accordance with the Basis of Payment provision in the Articles of Agreement, is subject to government audit both before and after payment is made. If an audit is performed after payment, the Contractor agrees to repay any overpayment immediately on demand by Canada. Canada may hold back, deduct and set off any credits owing and unpaid under this section from any money that Canada owes to the Contractor at any time (including under other contracts). If Canada does not choose to exercise this right at any given time, Canada does not lose this right.

2035 31 (2008-05-12) Right of Set-off

Without restricting any right of set-off given by law, Canada may set-off against any amount payable to the Contractor under the Contract, any amount payable to Canada by the Contractor under the Contract or under any other current contract. Canada may, when making a payment pursuant to the Contract, deduct from the amount payable to the Contractor any such amount payable to Canada by the Contractor which, by virtue of the right of set-off, may be retained by Canada.

2035 32 (2008-05-12) Notice

Any notice under the Contract must be in writing and may be delivered by and, courier, mail, facsimile or other electronic method that provides a paper record of the text of the notice. It must be sent to the Party for whom it is intended at the address stated in the Contract. Any notice will be effective on the day it is received at that address. Any notice to Canada must be delivered to the Contracting Authority.

2035 33 (2008-05-12) Conflict of Interest and Values and Ethics Codes for the Public Service

The Contractor acknowledges that individuals who are subject to the provisions of the *Conflict of Interest Act*, 2006, c. 9, s. 2, the Conflict of Interest Code for Members of the House of Commons, the Values and Ethics Code for the Public Service or all other codes of values and ethics applicable within specific organizations cannot derive any direct benefit resulting from the Contract.

2035 34 (2008-05-12) No Bribe or Conflict

1. The Contractor declares that no bribe, gift, benefit, or other Inducement has been or will be paid, given, promised or offered directly or indirectly to any official or employee of Canada or to a member of the family of such a person, with a view to influencing the entry into the Contract or the administration of the Contract.

2. The Contractor must not influence, seek to influence or otherwise take part in a decision of Canada knowing that the decision might further its private interest. The Contractor must have no financial interest in the business of a third party that causes or would appear to cause a conflict of interest in connection with the performance of its obligations under the Contract. If such a financial interest is acquired during the period of the Contract, the Contractor must immediately declare it to the Contracting Authority.

3. The Contractor warrants that, to the best of its knowledge after making diligent inquiry, no conflict exists or is likely to arise in the performance of the Contract. In the event the Contractor becomes aware of any matter that causes or is likely to cause a conflict in relation to the Contractor's performance under the Contract, the Contractor must immediately disclose such matter to the Contracting Authority in writing.

4. If the Contracting Authority is of the opinion that a conflict exists as a result of the Contractor's disclosure or as a result of any other information brought to the Contracting Authority's attention, the Contracting Authority may require the Contractor to take steps to resolve or otherwise deal with the conflict or, at its entire discretion, terminate the Contract for default. Conflict means any matter, circumstance, interest, or activity affecting the Contractor, its personnel or subcontractors, which may or may appear to impair the ability of the Contractor to perform the Work diligently and independently.

2035 35 (2008-05-12) Survival

All the Parties' obligations of confidentiality, representations and warranties set out in the Contract as well as the provisions, which by the nature of the rights or obligations might reasonably be expected to survive, will survive the expiry or termination of the Contract.

2035 36 (2008-05-12) Severability

If any provision of the Contract is declared by a court of competent jurisdiction to be invalid, illegal or unenforceable, that provision will be removed from the Contract without affecting any other provision of the Contract.

2035 37 (2008-05-12) Successors and Assigns

The Contract is to the benefit of and binds the successors and permitted assignees of Canada and of the Contractor.

2035 38 (2008-12-12) Contingency Fees

The Contractor certifies that it has not directly or indirectly, paid or agreed to pay and agrees that it will not, directly or indirectly, pay a contingency fee for the solicitation, negotiation or obtaining of the Contract to any person, other than an employee of the Contractor acting in the normal course of the employee's duties. In this section, "contingency fee" means any payment or other compensation that depends or is calculated based on a degree of success in soliciting, negotiating or obtaining the Contract and "person" includes any individual who is required to file a return with the registrar pursuant to section 5 of the *Lobbying Act*, 1985, c. 44 (4th Supplement).

2035 39 (2010-01-11) International Sanctions

1. Persons in Canada, and Canadians outside of Canada, are bound by economic sanctions imposed by Canada. As a result, the Government of Canada cannot accept delivery of goods or services that originate, either directly or indirectly, from the countries or persons subject to economic sanctions.

2. The Contractor must not supply to the Government of Canada any goods or services which are subject to economic sanctions.

3. The Contractor must comply with changes to the regulations imposed during the period of the Contract. The Contractor must immediately advise Canada if it is unable to perform the Work as a result of the imposition of economic sanctions against a country or person or the addition of a good or service to the list of sanctioned goods or services. If the Parties cannot agree on a work around plan, the Contract will be terminated for the convenience of Canada in accordance with section 29.

2035 40 (2008-05-12) Harassment in the Workplace

1. The Contractor acknowledges the responsibility of Canada to ensure, for its employees, a healthy work environment, free of harassment. A copy of the Policy on the Prevention and Resolution of Harassment in the Workplace, which is also applicable to the Contractor, is available on the Treasury Board Web site.

2. The Contractor must not, either as an individual, or as a corporate or unincorporated entity, through its employees or subcontractors, harass, abuse, threaten, discriminate against or intimidate any employee, contractor or other individual employed by, or under contract with Canada. The Contractor will be advised in writing of any complaint and will have the right to respond in writing. Upon receipt of the Contractor's response, the Contracting Authority will, at its entire discretion, determine if the complaint is founded and decide on any action to be taken.

2035 41 (2008-05-12) Entire Agreement

The Contract constitutes the entire and only agreement between the Parties and supersedes all previous negotiations, communications and other agreements, whether written or oral, unless they are incorporated by reference in the Contract. There are no terms, covenants, representations, statements or conditions binding on the Parties other than those contained in the Contract.

STANDARD INSTRUCTIONS AND CONDITIONS:

(APPLICABLE TO BID SOLICITATION)

1. **Submission of Bids**

1.1 It is the Bidder's responsibility to:

(a) return a signed original of the bid solicitation, duly completed, IN THE FORMAT REQUESTED;

(b) direct its bid ONLY to the Bid Receiving address specified;

(c) ensure that the Bidder's name, the bid solicitation reference number, and bid solicitation closing date and time are clearly visible;

(d) provide a comprehensive and sufficiently detailed bid, including all requested pricing details, that will permit a complete evaluation in accordance with the criteria set out in the bid solicitation.

Timely and correct delivery of bids to the specified bid delivery address is the sole responsibility of the Bidder. The National Research Council Canada (NRC) will not assume or have transferred to it those responsibilities. All risks and consequences of incorrect delivery of bids are the responsibility of the Bidder.

1.2 Bids may be accepted in whole or in part. The lowest or any bid will not necessarily be accepted. In the case of error in the extension of prices, the unit price will govern. NRC may enter into contract without negotiation.

1.3 Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the terms and conditions of the resulting contract.

1.4 Bids will remain open for acceptance for a period of not less than sixty (60) days from the closing date of the bid solicitation, unless otherwise indicated by NRC in such bid solicitation.

1.5 While NRC may enter into contract without negotiation, Canada reserves the right to negotiate with bidders on any procurement.

1.6 Notwithstanding the bid validity period stipulated in this solicitation, Canada reserves the right to seek an extension from all responsive bidders, within a minimum of three (3) days prior to the end of such period. Bidders shall have the option to either accept or reject the extension.

1.7 If the extension referred to above is accepted, in writing, by all those who submitted responsive bids, then Canada shall continue immediately with the evaluation of the bids and its approval processes.

1.8 If the extension referred to above is not accepted, in writing, by all those who submitted responsive bids then Canada shall, at its sole discretion: either continue to evaluate the responsive bids of those who have accepted the extension and seek the necessary approvals; or cancel the solicitation; or cancel and reissue the solicitation.

2. Late Bids

2.1 It is NRC policy to return, unopened, bids delivered after the stipulated bid solicitation closing date and time, unless they qualify as a delayed bid as described below.

3. Delayed Bids

3.1 A bid delivered to the specified Bid Receiving area after the closing date and time but before the contract award date may be considered, provided the delay can be proven to have been due solely to a delay in delivery that can be attributed to the Canada Post Corporation (CPC) (or national equivalent of a foreign country). The only pieces of evidence relating to a delay in the CPC system that are acceptable to NRC are:

(a) CPC cancellation date stamp;
(b) a CPC Priority Courier Bill of Lading; and
(c) a CPC Xpresspost Label,

that clearly indicate that the bid was mailed prior to the bid closing date.

Example: If the bid closing date was May 15, 1995, then the CPC cancellation date stamp should read no later than May 14, 1995, to be accepted.

3.2 Please request the postal employee to date-stamp your envelope.

3.3 For bids transmitted by facsimile or commercial telegram, only the date and the time of receipt recorded by NRC at the Bid Receiving number stated in the bid solicitation will be accepted as evidence of a delayed bid.

3.4 Misrouting, traffic volume, weather disturbances, or any other causes for the late delivery of bids are not acceptable reasons for the bid to be accepted by NRC.

4. Postage Meters

4.1 Postage meter imprints, whether imprinted by the Supplier, the CPC or the postal authority outside Canada, are not acceptable as proof of timely mailing. It should be noted that CPC does not normally apply a cancellation date stamp to metered mail; this is usually done only when postage stamps are used.

5. Customs Clearance

6.1 It is the responsibility of the Bidder to allow sufficient time to obtain customs clearance, where required, before the scheduled bid closing date and time. Delays related to the

obtaining of customs clearance cannot be construed as "undue delay in the mail" and will not be accepted under the Late Bids Policy.

For further information, please contact the Contracting Authority identified in the bid solicitation.

bid instructions_rfp.doc

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Province of Ontario
.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. most recent version.

1.02 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project and update project specific Health and Safety program as needed.

1.03 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

.3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety program.

1.04 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.05 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province of Ontario.

.2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise DND and NRC and follow procedures in accordance with Acts and Regulations of the Province of Ontario.

1.06 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
.1 Have site-related working experience specific to activities

associated with the work.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to the Contractor’s Project Manager.

1.07 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction.

.2 Provide NRC with written report of action taken to correct non-compliance of health and safety issues identified.

.3 DND or NRC may stop Work if non-compliance of health and safety regulations is not corrected.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

FINAL COMMISSIONING REPORT

TR000210
Hangar 1, CC-177
8 Wing Trenton, Ontario

November 1, 2012

Contractor: Bird Construction

Owner: Department of National Defence

Designer: SNC Lavalin, Halifax

Prepared by: Mark Forrester
Mark McNeill
Dan Munroe

Distributed to: Phil Reynolds (DND Project Manager)
Siva Gnananayakan (DCC Manager, Site Operations)
Vern Haggerty (DCC Construction Program Manager)
Major Renald Nelson (WCEO)
Steve Chinnatamby (ENGO)
Brian Lane (SNC Lavalin)

TABLE OF CONTENTS

1. PROJECT OVERVIEW

The new Hangar No. 1 consists of two hangar bays, separated by a 3 story space and surrounded on three sides with administration and shop support space. The hangar is primarily used for maintenance of the CC-177 and CC-130, but has the flexibility to be used for the CC-150 and other aircraft in the CF. The north bay is the corrosion control bay designed to for washing and paint touch ups with the aid of 2 telescopic platforms. The south bay is the fuel cell bay designed for maintenance on fuel cells and bulk fuel pods with the aid of an overhead crane and supporting shops.

The DND Project Manager is Phil Reynolds from 1 Canadian Air Division in Winnipeg. The Design Consultant PM is Brian Lane from SNC Lavalin in Halifax. The General Contractor is Bird Construction and DCC is the Commissioning Authority.

2. SYSTEM SUMMARY

PLUMBING

All drainage systems (sanitary, storm, industrial waste, effluent) are complete and have been tested with a minimum of 5 feet of head pressure. All domestic systems (cold, tempered, tepid and non potable) are complete and have been hydrostatically tested to 125 psi. Any leaks encountered were repaired and retested. All required flushing and chlorinating was completed and documented, there were no issues. The backflow preventers were also all tested and documented after the installation, with no issues. All fixtures were verified to be installed to code and tested for leaks. The Domestic Hot Water Tanks and Storage Tank were verified to be working as per drawings and sequences. The hot water recirculation system is working as per design, ensuring that the wait time for hot water at any particular faucet is minimal. The temperature of all tempered water was verified at the fixtures and all emergency eyewash/shower stations.

Observation or issues;

- During commissioning it was observed that the storage tank could not maintain a minimum temperature of 140 F with the hot water recirculation pump operating. The system pump was increased and this allowed the tank to reach its minimum temp overcoming the heat loss from the re-circ line.
- The hot water from the humidifiers is distorting the PVC drainage piping even though this discharge is diluted with cold water. A consideration for the use of cast iron or copper only would eliminate this.

NON POTABLE GREY WATER SYSTEM

This system consists of a 20,000L storage tank that is filled by 2 roof drains. It filters and sterilizes the stored water before it is distributed through the building to the toilets and urinals. The tank and all associated PVC piping were tested for leaks before start up. The filter, UV Light, pressure booster pumps and the domestic water make up valve were verified to be working as per specs and sequences.

Observations or issues;

- The 20,000L storage tank was drained unexpectedly on a couple occasions during commissioning. This appeared to be due to the type and location of its drain valve. The Contractor installed a lock on this valve to prevent this from happening again.
- The booster pump ran dry because of this and needed new seals. The low water sensor was replaced and re-verified.

COMPRESSED AND BREATHING AIR SYSTEM

The compressed air system consists of three compressors, one of which is a variable speed drive, two refrigerated air dryers, pre and post filters, a receiver tank and a constant pressure flow controller. All systems were pressure tested, leaks were repaired and re-tested. All systems verified to be working as per specs and sequences.

The breathing air system is composed of two separate purifiers and a receiver tank. Breathing air alarms are annunciated via the Building Automation System. A single alarm is sent from the BAS to each of the paint booth control systems, where breathing air is most often used, for annunciation to the user. Both systems were pressure tested and verified to be working as per specs and sequences. The Contractor and DND each took independent air samples for quality assurance.

Observations or issues;

- The check valves (as per drawings) serving the compressors and dryers interfered with the required pressure sensors downstream and needed to be removed in order for the system to operate properly.
- A ducted bypass complete with motorized dampers was added to all three compressors to regulate incoming air temperature
- After commissioning, there were two internal motor overloads tripped during a power event. This appears to be an isolated incident.

RINSE WATER SYSTEM

The rinse water system consists of two 293 KW gas domestic boilers, a 2200 L storage tank and a mixing valve station which supplies tempered water to the 2 telescopic platforms and 2 future hose stations in the corrosion control bay. All systems were pressure tested and verified to be working as per drawings, specs and sequences. The water temperature of the mixing valve and the re-circulation line were also verified.

Observations or Issues;

- It was noted that due to the height of the rinse water main and the outlets on the telescopic platform, a pressure booster pump may be a beneficial addition to this system.
- During commissioning, the boiler water temperature was raised to 150 F from 140 F in order to maintain a minimum storage tank temp of 140 F.

HIGH PRESSURE WASH SYSTEM

This system has 4 gas fired high pressure washers and one detergent holding tank. These units are piped to 4 independent wash/soap stations throughout the north hangar bay. This system uses recycled water and is manually controlled from each of the 4 stations. There is a domestic water make up valve controlled by the BAS system to open when the recycled water storage tank gets low. All systems were flushed and pressure tested with no issues. Each system was verified that it operated as per design.

Observations or Issues;

- During commissioning the system ran out of recycled water due to issues with the Waste Water
- Treatment and Recycling System.
    - The system has only one detergent tank and the user found this to be inconvenient when they actually use several different ones.
    - The 30m hose length was deemed insufficient by the users to reach enough of the aircraft for all stations. The users took the hoses from two stations and combined them to make two 60m hose stations.

WASTE WATER TREATMENT AND RECYCLING SYSTEM

This system reuses the water collected from the north hangar bay floor. It consists of a 35,000L underground storage tank, a pumping pit, and a filter treatment system which then supplies the high pressure washers. The system was started up and appeared to operate at first. Since that time there has been several issues found during commissioning with the operation and the system currently does not supply water to the pressure washers. That system is now on domestic water back up. DCC has issued a warranty call for the manufacturer to return to site and resolve these issues.

Observations or Issues;

- The low water level float did not activate the domestic water make up valve.
- It is suspected that a false high level alarm drained the entire storage tank to sanitary.
- A throttling valve was added to the high level drain in order to maintain enough pressure and volume for the high pressure washers.
- The PLC documentation is inadequate for troubleshooting.
- The room has a bad odor at times and does not have a dedicated exhaust.

TRENCH DRAINAGE AND VENTILATION

This system collects all water from the hangar bays and drains it to the waste water tank. Upon activation of the fire suppression system, a motorized valve closes and re-directs the water or foam towards the effluent tank. The drainage system has a series of pipes tied into it which ventilate all trench drains and catch basins on a continuous basis. All drains and vents were pressure tested. The ventilation fans were verified to be operating as per design and TAB.

Observations or Issues;

- During the sprinkler and foam generator testing, the trench ventilation systems filled with water and had to be pumped out. There are clean outs designed for this and this process should be part of any fire protection testing procedure.
- The effluent tank and all catch basins in both Hangar 1 and Hangar 2 are common to one another. Odors in the tank do spread to the hangars and it may be possible for odors or vapors to move from Hangar to Hangar through the effluent piping as there are no traps or check valves installed. This may affect the air pressures in the Bays but this was not noticed during commissioning. The systems will need to be maintained and cleaned. The Hangar 2 design team are working on options for corrective action to be undertaken as part of the Hangar 2 project.

WASTE OIL AND FUEL SYSTEM

These two separate systems consist of a transfer station, an air driven vacuum pump and a holding tank. The waste holding tanks will also be utilized by Hangar 2 as their systems will be compatible. All piping was flushed and pressure tested. The systems were commissioned and they operated as per design and manufacturer's directions. There is no BAS requirement.

Observations or Issues;

- Check valves may need to be installed when Hangar 2 ties into tanks. This will reduce the risk of waste oil or fuel from being pumped directly to the other hangar when the tank gets full or if there is an issue with the tank float.

FIRE SUPPRESSION

The fire suppression consists of a wet sprinkler system, a stand pipe system, a HEF foam system and multiple hand/hose foam stations. All systems are fed by 4 diesel fired fire pumps which draw water from a large holding tank underneath the fire suppression room. The hangar bays have a trench drainage system which collects all water, foam or fuel and directs it into a large effluent tank where it can be pumped out. All piping was pressure tested and flushed; all leaks were repaired and retested. The fire pumps were verified to be operating as per design. The HEF system was verified through a live test to be working as per design and samples were also taken during this test to ensure the foam was at the correct proportions. The hand/hose foam stations were operated and verified to be working as per design with the proper proportions. All fire dampers were verified to be installed and operating properly.

TESTING AND BALANCING

TAB was verified using sampling. All records were accurate and with in the 5% tolerance as per spec. There was several air handling units that required pulley changes which were done and re-verified. Seasonal commissioning for the 11th month warranty period will be scheduled for February.

Observations or Issues;

- The major challenge was the heights involved.

WING FUEL CELL EXHAUST SYSTEMS

This system consists of 8 automatic hose reels hung from the south bay ceiling which lower a pair of hoses down to the wing for connection to the fuel cells. Each hose reel has a supply and exhaust which are driven by independent supply and exhaust fans on the third floor. TAB was completed and the systems are performing to design. The hose reels and fans were commissioned and are operating as per design and sequences.

Observations or Issues;

- During verification, one of the hose reels brakes was malfunctioning which allowed the hose to unroll and not stop at a particular height. This was corrected.
- The hoses supplied as per design do not reach all the fuel cells and an additional DND supplied hose extension has yet to be added.
- The start button for the fans did not have a status to tell the user if the system was on or off. The button was changed to a toggle switch.

HYDRONIC SYSTEMS

There are 2 systems; one is a high temperature system which supplies hot water from 6 boilers to all the air handlers, fan coils, perimeter baseboards, unit heaters and heat exchangers. The other system is low temperature from 3 boilers which serve the in-floor heating in the hangar bays. Glycol is used to protect the in-floor heating at the Mock doors and in a couple of air handlers for outdoor air. All piping was pressure tested and flushed with very few issues. The chemical treatment and glycol was done and is still being monitored for 1 year. The boilers were commissioned and verified to operate as per design and sequences. All unit heaters, fan coils, cabinet heaters, baseboard radiation and AHU coils were verified to be working as per design and sequences. TAB was completed and verified to be within design requirements.

Observations or Issues;

- The boilers have been sporadically shutting down on various faults. The manufacturer has replaced all igniters with upgraded ones and these will be monitored.
- A design change was done to add a boiler bypass on both systems. This now allows the flow to continue at a minimum for the temperature sensors when all boilers and their motorized valves shut off.
- An issue was encountered with the warm weather shut down set point of the boilers. The unit heaters, rads, and fan coils were operating trying to satisfy the space temperature but the boilers were off. This adjustable set point was raised to allow the boilers to provide heat in the shoulder seasons.

HVAC

The HVAC systems consist of multiple air handling units, heating ventilation units and energy recovery units. There are also multiple humidifiers, exhaust fans, fan coils, fan powered boxes and VAV's. All equipment has been verified to be installed as per drawings and specs. Several random duct pressure tests were done and there were no issues.

Observations or Issues:

- In the areas with user pushbutton control of ventilation, the pushbuttons do not have lights to indicate current status. This leaves the user to guess the current ventilation mode, and they must push the desired mode again to confirm the status.
- During initial start-up, humidifiers were regularly causing duct smoke detectors to activate due to high humidity in the ducts. This issue was resolved by adding a time delay to the control sequence.

HVAC CONTROLS

The HVAC controls in H1 use a distributed controls strategy as opposed to the central control strategy used for HVAC in comparable buildings such as AMTC. This means that the control of the equipment is located on a Local Control Panel (LCP) supplied, installed and programmed by the equipment supplier. The BAS (DIV 25) system sends the LCP basic instructions for operation such as a schedule of occupied or unoccupied modes and supply air temperature and pressure set points. Using this information, the LCP operates the equipment at a functional level, opening, closing, and modulating valves and dampers while reading sensors and responding to feedback.

This strategy is intended to benefit the client by ensuring that equipment continues to operate as intended in the case of a failure of communications by the BAS. While this is a useful feature, there are a number of drawbacks, both during construction and during operation and maintenance that also should be considered.

- The installation and commissioning responsibility of the HVAC controls was defined by the "responsibility matrix" and commissioning sections of Division 25. This section included substantial contributions by the supplier that were not listed in the supplier's section. The supplier fought with DCC throughout the process about performing the supplier's responsibilities detailed in Div 25.
- There were many disputes between the LCP and BAS vendors. During point to point verification, both vendors were required to work together on the same points since BAS supplied external devices were terminated on the LCP. This lead both trades to claim that this activity was outside of their scope.
- The sequence of operation for the equipment does not clearly indicate what part of the sequence is to be controlled locally and what part is to be controlled at the BAS level. The equipment supplier and BAS contractor's submittals had to be read in conjunction in order to understand the actual operation of a particular piece of equipment. This combined operation was much more complicated than the Sequence of Operations from the project drawings. Documentation of the operation is difficult to follow due to the partial responsibility of the two competing firms.
- The resulting graphical interface is essentially limited to supervisory control and monitoring of the equipment.
- The requirement for the equipment supplier to train DND staff on their LCP controls is not well described in the specification (Nothing in Div 23 regarding LCP training). Further, DCC has been unable to find a requirement for the supplier of the LCP to provide DND software or access codes to log on to LCP directly for troubleshooting and maintenance overrides. This results in a "black box" that DND maintenance staff has no access to. The supplier of the LCP must be hired by WCE in order to make any additions or changes.
- DND O&M staff is frustrated by this setup because full access to the BAS does not actually provide the ability to see the actual control activities taking place within the LCPs.

CHILLERS

The chilled water system consists of two 110 Ton York chillers, 2 VSD pumps and a glycol feed unit. This system serves the cooling coils in 2 air handling units and 4 fan coil units. All piping was tested and flushed with no issues. The glycol and chemical treatment was done and verified and is still being monitored for a 1 year period.

Observations or Issues;

- The 2 cooling coils serving the paint booths were removed from the contract. This represented a large portion of the load on the chillers.
- The chilled lines serving the fan coil in the POD shop office were piped incorrectly which affected the flow. This was corrected and re-verified.
- 2 compressors and 1 condensing fan motor were replaced under warranty.

DUCTLESS SPLITS

There are 5 Mitsubishi ductless splits which serve the comms rooms independently. These systems were all pressure tested and verified to be operating as per design and installation instructions. The BAS monitors the room temperatures and will provide high temperature alarm.

Observations or Issues;

- Access to the locked rooms for commissioning was inconvenient.
- The length of some line sets to the outdoor units exceeded the limits in the installation instructions. The manufacturer did confirm that the lengths were at the limit but still acceptable.

PRE-CONDITIONED AIR UNITS

These 2 systems deliver cool dry air to the aircraft's cockpits and avionics. The units are located in the mechanical rooms and are ducted under the hangar bay floor to a pit which stores the main valve and flexible duct that attaches to the aircraft. The systems have been commissioned and several issues have been listed below.

Observations or Issues;

- Trying to arrange for the 3 specified aircraft to be in the hangar to verify the flows and temperatures was a challenge.
- The PCA units are shutting down on high head pressure from lack of ventilation air when they run at maximum. It was found during verification that the units are capable of producing much higher pressures and volumes than necessary to cool these particular aircraft. The units do not need to run near maximum.
- PCA units are commissioned and in operation in both bays. User interfaces for PCA units are being reviewed. The supplier is modifying the programming in order to give the authorized user greater ability to adjust airflow for each aircraft type.
- These units will be re-verified next summer during a design day.

DECONTAMINATION SHOWERS

There are two showers located beside the paint booths. They are designed to circulate air at high velocities and trap contaminations in the filtration units which are located above on the second floor. All safeties and velocities were tested during start up. Both systems were verified to be operating as per design and manufacturers specifications.

Observations or Issues;

- The units have an adjustable cycle time which has been field set to one minute. This time may need to be changed to meet the user's needs or any applicable codes.

LIGHTING

- Lighting fixtures installation is complete.
- Lighting Control system installation is complete.

UTILITY POWER

- New transformer and high voltage switchgear, commissioned and in operation.

BUILDING POWER

- Dual feeder main power entrances and tie breaker commissioned and in operation.
- Meggaring of all feeders was completed prior to power-up.
- Power Quality and Metering equipment is commissioned.
- Power factor correction equipment commissioned and in operation.
- Active harmonic filtering and Transient Voltage Surge Suppressors, (TVSS) are commissioned and in operation.
- All variable frequency drives have been commissioned.
- BAS data-logging verification of specified electrical equipment is complete.

AUXILARY POWER UNIT

- Generator factory testing and start up has been completed and witnessed. BAS verification complete.
- Automatic transfer switch has been tested.
- Currently online.

AIRCRAFT UTILITY POWER UNIT (HOBART)

- These units are commissioned and in use in both bays.

FIRE ALARM

- Fire alarm system verification is complete.
- Foam system verification is complete. Presently, the foam system is not activated by IR flame detectors as per direction from CFFM. Foam dump is manually only. Detectors will trigger alarm in the building and at the Fire Hall.
- Fire Hall transponder panel has been installed and tested.
- Network Interface Module, (NIM) is installed, tested and configured at both ends.
- Testing of the IR flame detectors was conducted to ensure complete coverage while limiting coverage outside of the building. With the users, DCC and CE, there is an ongoing review of the risks of accidental IR detector activation during normal operations. After this test period, it is expected that the CFFM will recommend the IR detectors to activate the foam fire suppression system.

LIGHTNING PROTECTION

- Lightning protection system installation complete.

FABRIC DOORS

- Commissioning and training is complete.
- Lift motor failures have occurred since commissioning. The issue is known to the supplier and a solution is forthcoming by the end of October, 2012.

PAINT BOOTHS

- Paint booth #1 and #2 are commissioned and in operation. Several warranty issues have been identified, especially related to automatic restart on power outage. These have not caused failures but have impeded painting operations. The supplier is expected to return to implement changes to allow more reliable operation of the booths.

MAN DOWN ALARM SYSTEM

- These are used only in the paint area. These are commissioned and in operation.

GAS DETECTION SYSTEM

- The gas detection systems are commissioned and in operation.
- The communication between the gas detection controller and the BAS uses a slow sampling rate which means that not all gas detections are transmitted to the BAS. APPIN and the supplier were unable to resolve this item.
- A warranty report has been sent to Bird as a sensor has failed.

PUBLIC ADDRESS SYSTEM

- The PA system is verified and has been configured by WTISS.

TELECOMMUNICATIONS

- All telecom rooms and equipment have been accepted for use by DIMTPS
- BACnet switches installed
- Electronic Safety and Security, (ESS) equipment has been delivered to WTISS as per specification.

FALL ARREST SYSTEM

- The fall arrest system is installed in both hangar bays through a series of rails installed above the different aircrafts. These systems were load tested and verified to be as per drawings, specs and design. There were no commissioning issues.

BRIDGE CRANES AND HOISTS

There is one 5 ton crane in the south bay and two 1 ton monorail hoists in the machine shop.
All cranes were load tested and verified. The commissioning was completed with some issues, but are now working as per design.

Observations or Issues;

- The trolleys were rubbing against the side of the rails in the corners. New trolleys were installed which have a little more clearance.
- The bridge crane was jamming. The supplier surveyed the rails and made adjustments with both the rails and trolley cars.

TELESCOPIC PLATFORMS

There are 2 platforms in the north bay which are designed to provide access to different aircrafts. Each platform is equipped with water, compressed and breathing air and electrical power outlets. All systems were verified to be operating as per design. All safety devices were tested and verified on the platforms without any issues.

Observations or Issues;

- There is no access to and from the platforms or catwalk upon emergency stop or a system malfunction.
- There is no means of moving the platform out of the aircraft's way in the event of a failure. The aircraft could be blocked in by one of these platforms.

3. COMMISSIONING ACTIVITIES REMAINING

- Seasonal commissioning of the heating and chilled water systems.
- TAB will be verified again in the 11th month.
- Chemical treatment monitoring for a 1 year period.

4. KEY CHALLENGES

There were many challenges on this project.

- The network controls strategy used the building telecommunications infrastructure and DND supplied equipment to connect the various BACnet IP devices throughout the building. Because the telecommunications installation was not complete well in advance of the other systems, commissioning of individual equipment was carried out prior to the connection of the equipment to the BAS network. This meant that additional review of the equipment/BAS interface was required after the BAS network connection was completed. It was a challenge to get the equipment suppliers to return to site after the connection of the equipment to the BAS network to confirm their equipment correctly integrated with the BAS graphic interface.
- The HVAC Controls strategy of using equipment supplier LCP's instead of HVAC controls from the BAS vendor resulted in finger pointing and inefficiencies between the two controls providers.
- The Fire Alarm system is required to report all status information to both the Firehall via NIM and to the BACnet simultaneously. When the system received many inputs at the same time, the hardware became overloaded and sometimes had a re-alarm upon clearing. Siemens built a mock-up off site and were eventually able to overcome this issue after the CFFM commissioning demonstration.
- The IR Fire Detectors were found to be more susceptible to false activation than had been originally expected. For example, a boom lift operating near the perimeter wall or a taxiing aircraft on the apron may have been enough to trigger a foam discharge based on the original design. In cooperation with the CFFM, a review of the fire detector configuration along with a user education/awareness strategy is underway to help ensure the best combination of fire safety and false alarm avoidance for the Hangar.

5. SUMMARY

Hangar 1 is a unique, highly capable maintenance facility designed to support Canada's transport aircraft fleet. Many of the individual systems are unique and required DCC and the contractors to develop custom commissioning strategies to ensure a quality installation.
With the commissioning complete, it is ready for operation with only a few issues remaining as detailed above. DCC recommends ongoing review of the building systems in order to monitor energy use, indoor environmental quality and ensure preventive maintenance is completed.

A supplemental report regarding Seasonal Commissioning and other issues will be issued at the time of the pre-warranty expiration review.

6. ATTACHMENTS

- Training Schedule – Final Version
- CX Canada Commissioning Manual – Posted to DCC FTP

COMMISSIONING REPORT

TR110110
Hangar 2
8 Wing Trenton, Ontario

May 2, 2014

Contractor: Graham Construction

Owner: Department of National Defence

Designer: SNC Lavalin

Prepared by: Dan Munroe, LEED AP BD+C
Mark McNeill

Distributed to: Wanda Deong (DND Project Manager)
Major Renald Nelson (WCEO)
Siva Gnananayakan (DCC Manager, Site Operations)
Dan Meens (DCC Construction Program Manager)
Steve Chinnatamby (ENGO)
Brian Lane (SNC Lavalin)

COMMISSIONING REPORT

TABLE OF CONTENTS

1. PROJECT OVERVIEW

The new Hangar No. 2 consists of two Hangar bays, separated by a shop space and second level mechanical room. Along the west side of the building there are a series of single story spaces to serve office administration, shop support, warehouse and loading dock requirements. The hangar is currently in use for second line maintenance of the CC-130J fleet of aircraft.

The DND Project Manager is Wanda Deong from 1 Canadian Air Division in Winnipeg. The Design Consultant PM is Brian Lane from SNC Lavalin in Halifax. The General Contractor is Graham Construction. DCC is the Commissioning Authority.

2. VERIFICATIONS COMPLETED

Fig. 1: Fire Rated Overhead Coiling Door

OVERHEAD DOORS

There are twenty overhead rollup doors, six of which are fire rated. All doors were verified to be operating as designed. The fire rated doors have a “Test a Fire” release device which is activated by the fire alarm. The safeties were tested and verified on all doors. Some minor adjustments were made. All fire doors were tested and verified to close upon fire alarm and by fusible link.

Fig. 2: Vertical Lift Fabric Door

FABRIC DOORS

There are two large fabric doors that serve the hangar bays. Each door consists of three panels and two mullions, with a dedicated motor for each component. They were commissioned with only minor issues that were quickly resolved. An operation procedure was posted at the control panels. Since the initial commissioning, there have been several issues observed with these doors. First, the mullion pits do not have drains, and as a result are often filled with water from the ramp. In the winter, the door on the north bay had some ice form in the pits when the door was open. Upon closure, the ice offset the mullion bases which resulted in strain on the mullions and some minor damage to the center door panel during closure. To help address the freezing issue, the slab temperature setpoint of the in-floor heating zones has been raised from 5°C to 15°C. Also, there are now ongoing issues with the door closed sensors and wind locks. The manufacturer has recently submitted a proposal for retrofit, which is under review by the designers. The Building Automation System (BAS) uses the fabric door open/closed status to enable the vertical unit heaters.

Fig. 3: Loading Dock

Fig. 4: Loading Dock Controller

LOADING DOCK EQUIPMENT

The loading dock installation was completed and tested early in the construction. There was an ongoing issue with flashing and tie-in to the building exterior composite panel system. The exterior was repaired to a weatherproof condition by the general contractor.

Fig. 5: Fall Arrest Tracks, Trolleys and Lifelines

FALL ARREST SYSTEM

The fall arrest system is installed in both hangar bays with a series of rails installed above the aircraft. These systems were load tested and verified with the vendor to be as per drawings, specs and design. There were no commissioning issues.

Fig. 6: Decontamination Shower

DECONTAMINATION SHOWERS

There are two showers located beside the paint booth. They are designed to circulate air at high velocities in the shower to remove contaminants and trap them in the filtration units which are located above on the mezzanine floor. Both systems were tested and verified with the manufacturer to be installed and operating as per design. The BACnet interface and several points were verified on the BAS.

Fig. 7: Fire Water Entrance

Fig. 8: HEF Tank, Foam Header and Proportioning Valves

FIRE PROTECTION

The fire suppression system consists of a wet sprinkler system, a stand pipe system, a HEF foam system and multiple hand/hose foam stations. All systems are fed from the Hangar 1 diesel fire pumps. The hangar bays have a trench drainage system which collects all water, foam or fuel and directs it into a large effluent tank shared by Hangar 1, where it can be pumped out. All systems were flushed and pressure tested. Leaks were

found, repaired and re-tested. The only major issue was the amount of sprinkler heads (app. 500) that needed replacing due to paint overspray. The stand pipe system was tested for flow and pressure at the highest point and met the NFPA requirements. The high expansion foam system was tested in both hangar bays with a live test, first with water only and then with the foam concentrate. One bay was triggered by a pull station and the other bay with a pan fire provided by the Wing Fire Department. Each of the hand hose foam stations were also live tested to ensure the correct foam concentration. All systems were verified to be operating as per design by Jacobs, SNC Lavalin, Vipond, Chemguard and the CFFM.

Fig. 9: Domestic Water Heaters and Storage Tank

PLUMBING

All drainage systems (sanitary, storm, industrial waste, effluent) are complete and have been tested with a minimum of 5 feet of head pressure. All domestic systems (cold, tempered, tepid and non-potable) are complete and have been hydrostatically tested to 125 psi. Any leaks encountered were repaired and retested. All required flushing and chlorinating was done with samples taken and no issues. All backflow preventers were tested and tagged. The Domestic Hot Water Tanks and Storage Tank were verified to be operating properly and communicating with the BAS. The exterior industrial waste tank and level monitoring control has been tested by filling and pumping the tank and checking all levels and alarms.

Fig. 10: Non Potable Water System

NON POTABLE WATER

This system consists of a 20,000L storage tank that is filled by 2 roof drains. It filters and sterilizes the stored water before it is distributed through the building to the toilets and urinals by a duplex booster pumping station. All piping was flushed and pressure tested and a few leaks were repaired and re-tested. Additional supports and thrust restraints were added to control the pipe movement from surge. The booster pump, circulation pump and UV light were verified to be operating as per design and communicating with the BAS.

Fig. 11: Office Area Washroom

PLUMBING FIXTURES

There are three sets of washrooms throughout the facility. There are two main locker/washrooms in the front entrance corridor for general building users and visitors. There are two washrooms in the decontamination area of the refinishing shop. There are two individual occupant type washrooms in the office area corridor. Lastly, there is a small unisex washroom in the warehouse area. All plumbing fixtures have been installed in accordance with the specifications and manufacturers instructions. All automatic toilets, urinals and lavatories have been tested and adjusted for ease of use and water conservation.

Fig. 12: Compressed and Breathing Air Plant

Fig. 13: Remote Breathing Air Alarm Station

COMPRESSED AND BREATHING AIR SYSTEMS

The compressed air system consists of two compressors, one of which is a variable speed drive, two refrigerated air dryers, pre and post filters, a receiver tank and a constant pressure flow controller. All piping systems were purged and pressure tested, all leaks were repaired and re-tested. The compressors and dryers were started and commissioned by the manufacturer's rep. There were a few issues with this system. The major one was that an exhaust fan needed to be added to the ventilation ducting to help remove the heat. The compressors internal fans were not meant to handle the amount of ductwork installed.

The breathing air system is composed of two separate purifiers and a receiver tank. All piping was purged and pressure tested, all leaks were repaired and re-tested. There was an issue with the quality of the breathing air at several locations. The breathing air samples taken at the purifiers passed, however, some samples taken at the points of use failed due to the detection of particulate. The system was re-purged and the threaded assemblies near the outlets were disassembled and cleaned. Re-tests of these outlets have all passed. Remote annunciation of the Breathing Air alarms was added to the project via change order.

Fig. 14: Waste Oil Collector

WASTE OIL AND FUEL COLLECTION

These two separate systems consist of a transfer station, an air driven vacuum pump and a holding tank. The waste oil and fuel holding tanks are located at Hangar 1 and serve both buildings. Both the waste lines and smaller signal lines were pressure tested. There were some leaks in the signal lines which were repaired and re-tested. The two systems were verified to be operating as per manufacturer's directions. Both systems in Hangar 1 and 2 were operated together and alternately to ensure there were no issues with the connection to a common holding tank.

Fig. 15: Domestic Water Meter

DOMESTIC WATER METERS

There are two water meters that are to be monitored by BAS. The water meters supplied by the mechanical contractor were purchased with a "remote readout" head rather than a "pulse output" head. Unfortunately, the BAS is not compatible with the meter supplied, and it appears that the meter manufacturer has stopped making the pulse output heads. The general contractor has recently submitted a shop drawing for a new water meter with a compatible pulse output and it has been reviewed. The water meter replacement work is not yet scheduled.

Fig. 16: AHU3 Fire Dampers with Verification Stickers Applied

Fig. 17: Close-up of Fusible Link

FIRE DAMPERS

In every location where a duct passes through a fire separation, fire dampers are installed. DCC has verified all of the fire dampers and has affixed a green sticker on each access door with the date and signature of the DCC representative that witnessed the final installation and testing. The contractor had a number of issues with the installation of the fire dampers, perimeter spacing, supporting angles and fasteners in the damper track are a few typical examples. For the bay ventilation, there was a dispute about if dampers were even available with the required ULC rating in the specified size. Eventually, all dampers were installed and verified to meet the specification requirements and manufacturer's installation instructions.

Fig. 18: EF-5 Mechanical Room Ventilation Fan

Fig. 19: EF-19 Fume Extraction Arm

EXHAUST FANS

There are 21 exhaust fans in Hangar 2. Some of the fans, such as those in the POL and Hazmat rooms, run 24/7 and have local alarms that activate in the case of failure. Exhaust fans serving the washrooms run on a time of day schedule. Fans in the mechanical and electrical spaces are controlled by the BAS to provide ventilation cooling. There are also fans that have user controls, such as the Fume Extraction Arm. All of the exhaust fans have been verified by DCC to be correctly installed and have been tested for design flow rate by the TAB subcontractor.

Fig. 20: Trench Drain Ventilation Unit

TRENCH DRAINAGE AND VENTILATION

This system collects the water from the hangar bays through a series of trench drains and directs the water or foam to the effluent tank at Hangar 1. The indoor drainage system has a series of vent pipes tied into it which ventilate all trench drains and catch basins on a continuous basis to prevent potential build-up of combustible gas. All buried drains and vents were hydraulically tested with no issues. The trench ventilation fans were verified to be performing and operating 24/7 as per design and communicate status to the BAS.

Fig. 21: Fuel Cell Exhaust Fan

FUEL CELL EXHAUST SYSTEMS

This system consists of 2 exhaust fans per hangar bay. These fans are mounted 3 meters above finished floor and are ducted up through the roof. Future users will install a flexible duct from these fans to the aircraft. The stainless steel exhaust stacks are complete and have been pressure tested for leakage.

Fig. 22: BAS Screenshot of Fan Powered VAV 2

AIR TERMINAL UNITS

There are 8 Variable Air Volume (VAV) units and 3 Fan powered VAV's. All units are controlled by the BAS. All hardware points have been verified by the BAS vendor, while DCC witnessed a substantial sample of the point to point verification. All of the software points required for operation of the units have also been verified via the BAS graphical interface.

Fig. 23: High Temp Boiler Plant

Fig. 24: Heat Exchanger # 1

HYDRONIC HEATING SYSTEMS

There are 2 systems; the main "high temperature" system supplies hot water from 6 boilers to all the air handlers via heat exchangers and to fan coils, unit heaters and perimeter baseboards. The low temperature system has 2 boilers which serve the in-floor heating in the hangar bays. Glycol is used for all AHU coils and for the in-floor heating zones under the Hangar bay fabric doors. All piping was flushed and pressure tested. All leaks were repaired and re-tested. The boilers are staged and fired by a plant controller provided by the

boiler manufacturer. The boilers were started and tested by a manufacturer's representative. All boilers are condensing type and the supply water temperature is reset based on outdoor air and demand to help maximize the condensation potential of the boilers.

Both the high and low temperature systems use a primary-only pumping configuration controlled by the BAS. Each boiler controls its own individual isolation valve. This configuration has provided a complex challenge to the commissioning team. See the Key Observations section for more details on the commissioning of this system.

Fig. 25: Chillers

CHILLERS

The chilled water system consists of two chillers, two constant speed pumps and a glycol feed unit. This system serves the cooling coils in 2 air handling units and 2 fan coil units. All piping was tested and flushed with no issues. The startup was done and verified by the manufacturer's rep. The glycol solution was done and verified and is still being monitored for a 1 year period. It was noted during commissioning that the flow was low throughout the building. However, it was soon noted that pumps had been running backwards. Commissioning of the system was performed by the manufacturer's rep in cooperation with the BAS subcontractor, and witnessed by DCC and the WCE refrigeration shop. However, some of the BAS interface properties are still not properly configured. An additional seasonal commissioning of the chilled water system is required and is tentatively scheduled for June 2014.

Fig. 26: Air Handling Unit 1

Fig. 27: Air Handling Unit 5

AIR HANDLING UNITS

There are 7 air handling units in H2. AHU1 serves the office space and provides ventilation and cooling to the VAV's and FVAV's in the finished areas. AHU2 serves the main washrooms, west shops, warehouse and loading dock. AHU3 serves the center shops. AHU4 serves the south hangar bay. AHU5 serves the north hangar bay. AHU6 serves the refinishing shop. AHU7 serves the AVS/AVN shop. Each unit installation required extensive coordination between a team of trades to achieve a very specific configuration. Each custom package unit included a Local Control Panel (LCP) and various packaged sensors and actuators by the equipment supplier. Also, additional sensors and actuators remote to the unit were supplied and wired directly to the equipment supplier's LCP by Division 25. This required the equipment supplier and the Division 25 contractor to perform combined point to point verification for these hardware points.

The functional verification of the Air Handling Units was also a significant challenge. The sequences of operations were defined in part on the project drawings, with additional general requirements defined in the Division 25 specifications. It was not always readily apparent what part of the sequence was to be performed by the LCP, and what part of the sequence was to be performed by the BAS. DCC worked with the equipment vendor to verify the function of the LCP, and then prepared commissioning sheets to clarify how the BAS was to interact with the LCP to achieve the overall design intent. The final functional verification forms came out of an iterative process involving feedback from the mechanical engineer, the control system designer, the BAS contractor, the LCP vendor, building operators and DCC. See the Key Observations section for more details on some of these systems.

TAB

Testing Adjusting and Balancing of the air and hydronic systems has been completed and the final report has been reviewed by the designers. DCC is scheduled to continue with additional verification through random samples and additional targeted measurements in areas of interest.

Fig. 28: Energy Recovery Units 2A & 2B (AHU5 in background)

ENERGY RECOVERY UNITS

These units are associated with the two large air handling units that serve the hangar bays. Exhaust heat is reclaimed via a recovery coil and pumped back through a heating coil in the air handling unit. These systems are glycol and are complete with feed tanks, expansion tanks and pumps. All piping was flushed and pressure tested with no issues. A duct pressure test was done on one unit without any issues. All ductwork, piping and equipment was installed and verified as per design.

Fig. 29: Dust Collector

DUST COLLECTION SYSTEM

The dust collection system is a packaged unit and has been installed in accordance with the manufacturer's instructions. One issue was observed during start-up where it did not turn off when the main switch was turned off. After consultation with the supplier, it was determined that the unit post purges for a period to time to ensure the collection ducts are free of dust before the motor is powered down.

Fig. 30: Condensing Unit #1

DUCTLESS SPLIT AIR CONDITIONERS

There are 3 Mitsubishi ductless split A/C units which serve to cool the communications rooms independently. These systems were all pressure tested and verified to be operating as per design and installation instructions. The BAS monitors the room temperatures and provides a high temperature alarm which was verified. These units are operating continuously with no concerns.

Fig. 31: Horizontal Unit Heater

Fig. 32: Vertical Unit Heater

UNIT HEATERS

There are three types of unit heaters in various locations around the hangar. Cabinet unit heaters are used in entrance locations to ensure that spaces that get cold when doors are opened are quickly reheated. Horizontal unit heaters are used in shops and service areas. Each bay has four very large vertical unit heaters with a circulating nozzle used to recover the bay temperature when the hangar bay doors are opened during the heating season. All of the unit heaters are controlled on a zone basis by the BAS. Point to point verification of the heating valves and fans was completed and operation of all units has been verified by DCC.

Fig. 33: Gas Fired Humidifier, HUH2

Fig. 34: Electric Humidifier, HUH7

HUMIDIFIERS

There are two main types of humidifiers in use in the hangar. HUH1, 2, 3 and 6 are gas fired, while HUH7 is electric. There were a number of issues over the course of construction and commissioning for the gas fired units. The designer had intended the units to have sealed combustion, however, the specification was not explicit and the units were ordered without this configuration. Ultimately, dedicated combustion air ducts were installed, but terminated above the floor outside of each humidifier cabinet. When the humidifiers were started up, there were some control issues, first with burners locking out due to internal safeties within the gas controllers, and later with firing rate modulation issues and cycling. Now, all of the humidifiers have been tuned to provide stable humidification and status information is passed to the BAS via the AHU LCP's. The electric humidifier was installed in accordance with the manufacturer's instruction and has been operating trouble free.

Fig. 35: BAS Workstation

BUILDING AUTOMATION SYSTEM - BAS

All major systems within the building are linked together to the Building Automation System for control and/or monitoring. The BAS controls all of the heating water distribution and all HVAC terminal units. The BAS manages occupancy schedules for equipment that runs on a schedule. The H2 BAS is interconnected to a group of other buildings at 8 Wing Trenton on a private Facility Network named the "Facnet". The Facnet links the various new facilities to each other and to user workstations in the various WCE shops, so any user at any location on the network can view the status of any equipment or system on the network. All application and trend data is also backed up on a centralized server.

There have been some ongoing concerns related to the architecture selected for the Facnet, and additional details on the challenges of integrating the various facilities can be found in the "Controls Integration Report," distributed by DCC in February 2014. Despite the challenges, H2 is now fully functioning live on the Facnet and trend data is being stored on the central server as per the design.

In order to connect to the various building systems, a combination of BACnet IP and BACnet MS/TP protocols are used. For systems that are connected via IP, the connection is made via the building telecommunications structured cabling. Each IP device is assigned a unique static IP address, default gateway and subnet mask. For systems connected via BACnet MS/TP, the BAS contractor loops together devices in series and assigns all the devices on each loop a unique network number. Every BACnet device on the Facnet is assigned a unique BACnet Device ID# or Instance Number.

Once a device is configured and connected to the BAS, the BAS vendor's software queries the device and "discovers" the device's "object list". This list contains all of the various points of data on the equipment that the device is capable of communicating with the BAS. Often, the discovered object list does not match documentation provided by the equipment vendor. The BAS subcontractor worked through with the vendor which points of data were functional and which to disregard. DCC and the BAS subcontractor worked

together with the vendors to determine what functioning points of data from the object lists would be most relevant to the building operators and maintainers. The most important data was displayed prominently on the main page for that equipment, while other, more obscure data was displayed on a secondary equipment page. All of the alarms from all equipment were “mapped” to the graphics and verified to annunciate to the main BAS alarms page.

DCC and the BAS subcontractor have spent many hours reviewing the object lists and refining the graphics to ensure that each system was represented in the most appropriate way based on the information available from the vendors. Although a comprehensive review of all potential errors within this system is beyond the scope of this commissioning process, DCC has witnessed a substantial sample of mapped points including the most important objects through the graphics and is confident that the H2 BAS system and graphics package are complete and generally free from errors. A series of BAS graphic screenshots are included in Appendix 7 of this report.

Fig. 36: Gas Meter

GAS METER

The gas meter was provided by Union Gas and is connected to the BAS via a pulse output. Over the course of the winter, the BAS counter advanced more quickly than the gas meter readout by approximately 10%. The BAS subcontractor has met with Union Gas instrument technicians on more than one occasion to attempt to correct this issue. Since the last meeting with Union Gas, no difference in consumption totals has appeared. This item should continue to be monitored.

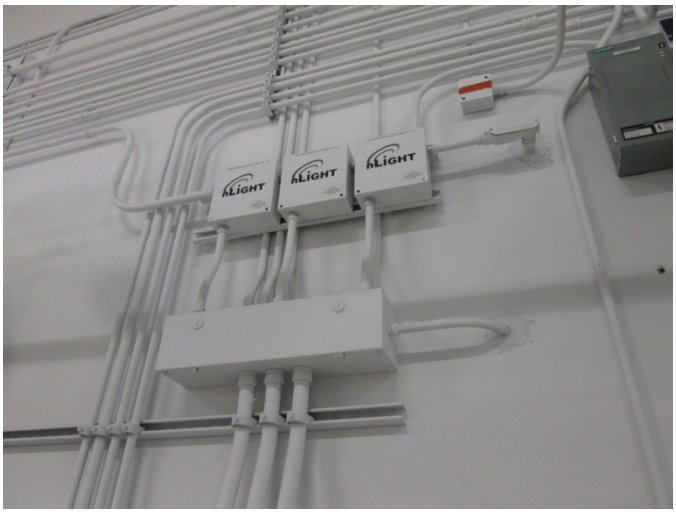

Fig. 37: Bay Lighting Relay Panels

Fig. 38: Reception Area “Wallpod”

LIGHTING

The lighting control system is installed and verified to meet the requirement of the lighting specification. The fixtures, switches, relays, occupancy sensors and other lighting system components are installed and verified. The bays and refinishing shop use metal halide fixtures and the rest of the facility uses a variety of fluorescent fixtures. The BAS interface of the lighting system was an ongoing issue over the course of the project. Instead of a hardware BACnet interface device or gateway, the lighting system vendor proposed to use their operator software to pass data to the BAS. The data is represented in an unusual way in BACnet, and a large number of BACnet device ID’s were required to allow the lighting system to pass all of the required data. The lighting BAS interface has only recently been verified to function, and final verification of the BAS interface for lighting is pending.

Fig. 39: Switchgear and Transformers

UTILITY POWER

A new sectionalizing switchgear and two new transformers are installed and verified. Utility Power was established on the main switch gear as of September 2012. High-Pot testing of all primary power conductors was completed by the contractor and witnessed by DCC. Transformer high temperature alarms are monitored by the BAS.

Fig. 40: Low Voltage Switchgear

Fig. 41: Power Meters

BUILDING POWER

The building low voltage switchgear consists of two main breakers, a tie breaker and a series of breakers serving the various main distribution panels. Each main breaker normally serves a portion of the facility, while the tie breaker makes it possible to serve the entire building from either main breaker. Distribution systems have been installed in accordance with the design. Meggaring has been completed on all 600V circuits. Each main breaker has a dedicated power meter and there are three sub-meters for selected panel feeders. All metering equipment has been verified by the manufacturer and is fully integrated to the BAS. An ESA Certificate of Inspection has been issued for the facility.

Fig. 42: Active Harmonic Filter

ACTIVE HARMONIC FILTERS

There are two active harmonic filters installed to improve power quality within parts of the distribution system containing substantial VFD motor loads. The Active Harmonic Filters were commissioned by the manufacturer's representative and are fully integrated to the BAS.

Fig. 43: Power Factor Correction Units

POWER FACTOR CORRECTION

There are two power factor correction units, one associated with each main entrance breaker. The power factor correction units utilize capacitors to effectively reduce the apparent power consumption of the facility. The power factor correction units were commissioned by the manufacturer's representative and are fully integrated to the BAS.

Fig. 44: Surge Protection Device

SURGE PROTECTON DEVICES

There are eight surge protection devices distributed througout the electrical power distribution system. The SPD's, often also referred to as TVSS (Transient Voltage Surge Suppressors), are panel mounted and are capable of diverting the current associated with voltage spikes to ground. All SPD's are 600V, 3 phase, have a capacity of up to 150kA and can respond to a voltage surge in less than ½ of a nanosecond. DCC witnessed the start up and verfication by the manufacturer's representative. Each unit has a dry contract alarm that is annunciated through the BAS.

Fig. 45: Variable Frequency Drives for Pumps

Fig. 46: Variable Frequency Drive for AHU Fan

VARIABLE FREQUENCY DRIVES

There are two types of variable frequency drives in the Hangar. All of the packaged AHU's use Danfoss drives while the hydronic pumps use MCC mounted Siemens drives. All of the VFD's in the building are connected directly to the BAS via BACnet MS/TP, so a large quantity of status information is available for operators to monitor remotely. All drives were set up to ensure that they would not run below the minimum speed of the associated pump or fan.

Fig. 47: Lightning Protection at Parapet

Fig. 48: Lightning Protection at Breeching

LIGHTNING PROTECTION

The lightning protection system and building perimeter grounding system are complete. Lightning arrestors are installed along all building parapet walls and all exposed mettalic components are bonded to the grid. A combination of bolted connections and exothermic welds were used for this system. The conductors are copper except were aluminum is used along the parapet walls to prevent contact of dissimilar metals. The grid on the roof is adhesive applied and all roof membrane penetrations associated with this system are located on the parapet sidewalls. DCC witnessed the contractor's testing of this system.

Fig. 49: Generator and Fuel Tank

Fig. 50: Automatic Transfer Switches

AUXILARY POWER UNIT

The generator was tested in the factory and on site. A series of full building power outage tests were conducted, including one during the CFFM's life safety systems tests. Both Automatic Transfer Switches are functioning correctly and the BAS interface is communicating. DND is continuing with routine generator run tests and no issues have been identified.

Fig. 51: 400Hz Frequency Converter

Fig. 52: 400Hz Aircraft Cable Reel

AIRCRAFT GROUND POWER UNIT – FREQUENCY CONVERTER

The 400Hz frequency converters and cable reels supply ground power for the CC130 aircraft. The installation required some modifications due to components that were not listed for use in Canada. All issues have been resolved to the satisfaction of the ESA inspector and the units are now in use and functioning correctly. The BAS interface is also fully functioning.

Fig. 53: Electric Vehicle Charging Station

ELECTRIC VEHICLE CHARGING STATION

The Electric vehicle charging station was added to the contract via change order. It was installed in accordance with the manufacturer's instructions and has subsequently been successfully "field tested" on a building visitor's electric car.

Fig. 54: Active Graphic and Remote Annunciator

Fig. 55: Fire and Foam Pull Stations, Foam Abort Station

FIRE DETECTION AND ALARM

The Fire Alarm is a Class A addressable system, complete with flame sensors to provide automatic activation of the foam fire protection system. DCC witnessed the contractor's verification of the Fire Alarm system to ensure it met the requirements of ULC 537. All alarm input devices were triggered and verified to match the alarm descriptors on the panels and the active graphic. Sound pressure levels were measured and adjusted, strobe intensity and lines of sight verified and a 24 hour battery test was conducted. Output relays for AHU shutdowns and door closures were verified. The automatic transmission of alarms to the Wing Fire Hall via the transponder panel was also verified in cooperation with WCE and WFH. Further random iterative testing was also conducted with the SNC Lavalin Engineer and the CFFM representative during the life safety systems demonstrations prior to building occupancy.

Fig. 56: Man Down Alarm Activation and Reset Units

MAN DOWN ALARM SYSTEM

Within the paint booth, the Man Down Alarm is a life safety feature to allow the booth user to call for assistance in the event of an emergency. The man down alarm has three annunciators, one directly outside the booth, one in the lunch room and one in the shop supervisor's office. The man down alarm system installation meets the requirements of the electrical code for Class 1, Zone 1 and has been verified.

Fig. 57: Telecom Cabinet

TELECOMMUNICATIONS

Horizontal and backbone structured cabling is installed and tested. The BAS (Building Automation System) IP facility network (Facnet) is hosted on the structured cabling. The access control and CCTV system is also IP based and is in operation. DND/Shared Services Canada have also proceeded with the implementation of telephone and network services for the building users. DCC monitored the installation and verification of the structured cable systems in cooperation with representatives from Shared Services Canada.

Fig. 58: Gas Detection Alarm Controller, CO & NOx Detectors

GAS DETECTION SYSTEM

Two types of Gas Detection systems are installed in H2. In the hangar bays, combustible gas detectors monitor the level of hydrocarbons in the air and alarm when the setpoint level is detected. During an alarm event, a local audible alarm is annunciated and a dry contact is closed to enable the high ventilation mode in the AHU for the affected bay. In the service corridors, CO/NOx gas detectors are wired to dedicated outdoor air louvers and exhaust fans to ventilate the corridors on demand. All gas detectors, alarms, ventilation interlocks and reporting to the BAS has been verified.

Fig. 59: Hangar Bay PA Speakers

PUBLIC ADDRESS SYSTEM

The building has a PA system with 5 zones. The microphone is currently located in the MTR and is capable of broadcasting to any or all zones. The system is designed to be capable of allowing users to access it via telephone. WTISS and the Wing PBX technical representatives will be completing this work in the near future. The PA has also been tested to broadcast signals from the Wing level PA and/or the Wing Crash Alarm. DND forces will complete the final configuration of this system.

Fig. 60: Access Control Point

ACCESS CONTROL AND CCTV

Hangar 2 is part of the 8 wing GRA (general restricted area) and is subject to GRA access control restrictions. Three access control points along the west wall provide users with flexibility to directly access the various zones of the facility. Exit doors that are not access control points have door contact type alarms. The site is also monitored with a series of CCTV cameras including a FLIR camera. The access control and CCTV system was commissioned in partnership with Shared Services Canada and WTISS. Integration of the installed components with the Wing security network is beyond the scope of the H2 project.

Fig. 61: Sewage Lift Station

SEWAGE LIFT STATION

The package sewage lift station pumps sewage into a forced main that eventually flows into the 8 Wing water treatment plant. The lift station comes complete with a chain hoist for maintenance and a fresh air circulating fan to eliminate the accumulation of potentially harmful gases within the vault. The lift station pumps and high level alarms are monitored by the BAS via a series of dry contacts. All functional and monitoring requirements were completed by the contractor and witnessed by DCC.

Fig. 62: Hangar Bay Bridge Crane

BRIDGE CRANES AND HOISTS

There are two 5-ton under running cranes, one in each hangar bay. There is also one 4-ton top running crane in the warehouse and two 2-ton monorail hoists in the refinishing shop.
All cranes and hoists were 3rd party load tested and verified. The verification and commissioning was completed without any issues.

Fig. 63: Paint Booth

PAINT BOOTH

There is one down draft paint booth which consists of a ceiling supply air plenum with intake filter pit and filter house exhaust plenum with three-stage particulate exhaust filtration. There is a make-up air-handling unit c/w humidifier and cure cycle, an exhaust fan and control panel with static pressure based fan speed controllers. This system was started and commissioned with the manufacturer. Multiple cycles were done to verify the functions of all modes of operation. All safety functions and switches were tested and verified. TAB was completed by the manufacturer and all airflows were as per design. The BACnet interface and software points were verified to the BAS.

3. KEY COMMISSIONING OBSERVATIONS AND RECOMMENDATIONS

HIGH TEMPERATURE HEATING SYSTEM - FLOW

The most challenging dynamic control routine to successfully implement on this project has been the Hydronic Heating distribution system. The fundamental issue is with maintaining system flow with the primary-only pumping configuration. Under low demand conditions, the system utilizes a bypass valve installed in a remote part of the system to maintain the minimum flow rate through the primary pumps.

Pump speed is controlled based on the measured Differential Pressure (DP) in a series of locations throughout the building. The DP setpoints were established by measuring the flow rate at a given unit downstream of a DP sensor and adjusting the pump speed. When the measured flow rate meets the design flow rate, the current value of the DP sensor becomes that sensor's DP setpoint. In operation, pump speed is ramped up until all DP sensor values meet their individual setpoints.

Each boiler has an isolation valve that opens just prior to the boiler firing and closes just after the boiler stops firing. Early in the project, it was determined that an additional bypass valve at the boiler plant would be required to permit flow to be maintained when the system is in operation but no boilers are firing. The boiler bypass routine originally looked at data from the boiler plant controller. The default position of the valve is open, closing only when the plant controller called any boiler to fire.

The flow rate is measured by a flow meter at all times. After some time in operation, it was noted that the flow rate trend was intermittently dropping to zero. After investigation, it was noted that the plant controller often showed a single boiler firing at a very low firing rate, but the boilers would not actually start up until the call to fire reached a minimum rate. So it was determined that the BAS needed to look directly at each boiler status to determine if any of them were firing. The routine was updated so that the BAS will close the boiler bypass valve whenever any boiler sends a flame proven status.

In general, when there is enough demand in the system to keep a single boiler firing on low fire, the system is working very well. However, in the shoulder season, when there is lower demand in the system, a single boiler will fire for a period of time, and then shut down. When no boilers are firing, the bypass valve is commanded to open. With the boiler isolation valves closed and the bypass valve open, there is often still demand in the system requiring more than the minimum flow rate. In this condition, the bypass appears to be restricting flow and causing a drop in the system DP measured values. In response to the drop in system DP, the pumps automatically ramp up to try to meet the DP setpoints. Over the course of a few minutes, the pump ramps up to 100% speed, but the system DP setpoints are not reached. This situation is resulting in very high system pressures that have frequently caused boiler pressure relief valves to open to drain.
The flow meter on the boiler water make-up assembly indicates that the system has used approximately 143 cubic meters of water since startup. It is predicted that most of this water use is as a result of this low demand pressure relief condition. See the final page of Appendix 8 - "BAS Screenshot Samples" for a screenshot of the system in this condition.

There are several complicating factors that relate to this issue. First, the boiler insolation valves are very fast moving valves, while the bypass valve is a relatively slow moving valve. Also, the BAS can only see the firing status of the boiler and does not know each boiler's valve command or status. Lastly, the boiler plant controller and the BAS are having intermittent communication failures, often lasting between 30 to 90 seconds.

Fig. 64: Boiler Isolation Valve

Fig. 65: Boiler Bypass Valve

To remedy this issue, first the communications issues between the BAS and the plant controller need to be resolved. A Warranty call has been issued on this item. If, as predicted, this situation persists after the communication issue is resolved, DCC recommends replacing the boiler bypass valve with a larger, faster moving valve.

AHU2 SPACE STATIC PRESSURE CONTROL

AHU2 serves the washrooms, front entrance corridor and the shops and warehouse along the west wall of the building. The designer provided a single VAV box to serve the front entrance corridor with the intent that it would pressurize the front corridor with respect to the adjacent refinishing shop space. The other side of the corridor is the washrooms, which have a large exhaust fan and also maintain a negative static pressure with respect to the corridor. During TAB and commissioning of the dynamic pressure routine for this AHU, it has not been possible to meet the original static DP setpoint of -25 from the shop to the corridor.

Using the original TAB volumes, the static pressure in the shop was positive with respect to the corridor. The exhaust air volumes in the shop adjacent to the corridor were increased by site instruction and now a slight negative pressure condition generally exists.

Attempts to use a fan speed static pressure routine to increase the differential were not successful. The routine is designed to increase or decrease the AHU exhaust fan speed in order to meet the pressure setpoint. However, the supply air grilles in the most remote part of the zones require the supply fan to run at 100%, therefore, the exhaust fan would need to increase its speed above 100% to create the negative air pressure desired in the shop.

During winter seasonal commissioning, the sweeps of the various doors in the corridor were taped and it was determined that a positive static pressure was generated. It is noted that if there are ongoing issues with this static pressure difference, door sweeps and seals may be added to the doors along the front entrance corridor or additional balancing adjustments may be made. If a more substantial pressure difference is desired, DCC suggests that an additional duct takeoff in the front entrance corridor would be required.

AHU6 HEAT PIPE PACKAGE CONTROLLER

AHU's 2, 3 and 6 each have a heat pipe. Flow through the heat pipe is controlled by a package controller provided by engineered air called a Q-TRAC. The Q-TRAC controls a face and bypass damper to control the flow of air over the heat pipe. It is a standalone controller and does not pass data to or receive a setpoint from the BAS. DCC is concerned that the package controllers, particularly on AHU6, are not optimizing the heat recovery potential of the Heat pipes.

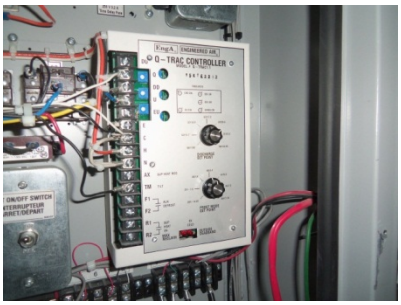

Fig. 59: Q-TRAC Heat Pipe Controller

On the BAS interface, the operator can see if the LCP has enabled the Q-TRAC controller, but that does not necessarily mean that the controller has enabled energy recovery. This is an important distinction. AHU6 in particular has been frequently observed to be in bypass during periods of potential energy recovery. Each Q-TRAC has two setpoints, selected by dial. The upper dial selects the discharge air setpoint below which energy recovery is enabled. The lower dial selects the frost mode temperature, below which the face damper and bypass damper are modulated to prevent frost on the coil. Both of these setpoints reference the "post-recovery" temperature, a sensor on the downstream face of the recovery coil. (See Photo below)

The issue within AHU6 may be partly related to the geometry of the unit. On a number of occasions, the unit has been observed to have a good "post recovery" temperature, but a much lower mixed air temperature. This is a sure indication that the heat pipe is not operating. See the marked up photo below.

Fig. 66: Heat Pipe Face Damper Closed, Bypass Open

Fig. 67: AHU6 Mixing Section

From the photo, it can be seen how the heat from the return air stream and the radiant heat from the isolated heat pipe would keep the “post recovery” temperature sensor relatively warm. The cool outside air is not mixing but passing above the “post recovery” sensor and flowing directly to the heating coil. When the post recovery temperature is above the Q-TRAC setpoint, reclaim is left off indefinitely. In order for reclaim to commence, the outside air must be sufficiently cold to overcome the warmth of the return air.

When the discharge air setpoint of the Q-TRAC is raised to the maximum setting, the recovery is still not operating. It is possible that this issue is simply a matter of a malfunctioning Q-TRAC unit. DCC is working with DND Controls shop to confirm if a warranty call will be made on this item. If the Q-TRAC is working, there are still a number of ways that this situation could be improved. One possible low cost strategy would be to deflect some air from the bypass air stream down over the “post recovery” sensor. Other alternatives would include adjustment to the sensor location or even replacing the Q-TRAC with a controller capable of using outside air temperature as part of the energy recovery routine.

AHU1 OUTSIDE AIRFLOW

The outside air duct to AHU1 is monitored with a flow station. The unit has two outside air dampers, one for control in minimum outside air conditions, and one for economizer operation. The LCP includes a routine that is supposed to modulate the minimum outside air damper along with the return air damper in order to meet the outside airflow setpoint. Recently it has been observed that the outside airflow is regularly falling short of the setpoint. It is noted that the return air damper is operating with the economizer, but is not operating as part of the minimum outside air routine. DCC is following up with the contractor to have the LCP program reviewed to ensure the outside airflow control works correctly.

EXTERIOR ROLL-UP DOORS – HEAT LOSS

During the winter of 2013-14, areas with exterior roll-up doors experienced sustained low temperatures despite unit heaters in those zones working correctly. DCC inquired with the designer who confirmed that the tug corridors and loading dock area should have adequate heating capability provided the roll-up doors are meeting the performance requirements. After further investigation by DCC and SNC Lavalin, issues with the installation and the design were noted. The door supplier has returned to site to install deeper brushes and seal around the perimeter of the shroud, a warranty call related to this is still active. The designer has used a door track insulation detail for a future project that may also need to be applied to the H2 doors to further improve their thermal performance.

FIRE PROTECTION ROOM # 1048 – LOW TEMPERATURES

The water entrance room also showed signs of being underserved with heating. This room is small, but has a high ceiling, and has just one small cabinet radiator. DCC had the general contractor come to the site on warranty to improve the seals on the door around the door closer. Unfortunately, the issue with low space temperatures persists. DCC recommends that additional heating capacity be added to this room.

NON POTABLE WATER SYSTEM

This system generally appears to be working well, however, the UV light feels unusually warm to the touch and there is some concern if the flow rate of the recirculating pump is adequate. With the small pump, there is no significant pressure drop across the filters. Water flow can be heard by closing and reopening an isolation valve. DCC recommends that a sight glass or other flow indicator be added to the recirculation loop to allow operators to check on the flow.

FUEL CELL EXHAUST SYSTEMS

DCC recommends that temporary caps or slide gate dampers be added to the intake ducts of these fans, as substantial stack venting is observed throughout the heating season.

ACCESS CONTROL IN MECHANICAL AND ELECTRICAL ROOMS

As part of the security of the GRA, access control points were installed where the main mechanical room and main electrical rooms connect to the building. Each room still has an outside door with a crash bar to exit. DCC notes that in the event of fire or other emergency in one of these rooms, egress from the rooms is limited to a single path.

DIFFERENTIAL PRESSURE TRANSDUCER ON HX-3

The differential pressure (DP) sensor installed in the vicinity of heat exchanger 3 has failed. The mechanical subcontractor installed the sensor without isolation valves because they were not explicitly shown on the schematic drawing. Now the sensor needs to be replaced, but there is a 6m high column of water above the sensor. The mechanical contractor has indicated that they intend to wait until the heating season is over, and then they plan to freeze the pipe at the sensor and perform the replacement.

AIR COMPRESSOR HIGH AMBIENT BOOSTER

The air compressors use a substantial amount of cooling air apart from the air that is compressed for use in the system. The intake and exhaust openings on the air compressors are ducted to the outside. The two ducts are connected via a damper that modulates open to maintain a cooling supply air temperature of 5°C when the outside air temperature drops below 5°C. During the commissioning of the air compressors, the measured flow rates of the cooling air were well below the airflow requirements listed by the manufacturer. This was due to the static head losses associated with the ducting to the outside. DCC advised DND and the designer of this issue. A VFD controlled booster fan and temperature sensor was added to the exhaust side of the air compressor ducting. An additional routine was added to the BAS to monitor the exhaust air temperature. When the exhaust air temperature rises above setpoint (30°C) the exhaust booster fan starts and ramps up as required to maintain an exhaust air temperature no greater than setpoint.

MECHANICIAL ROOM VENTILATION

During TAB, it was determined that the duct serving EF-5 in the boiler room was undersized and would not permit the fan to run at its rated flow. DCC noted this issue to DND and the designers, and a change was made to increase the size of the exhaust duct and the intake louver.

PAINT BOOTH NETWORK CONFIGURATION

The paint booth uses a BACnet IP connection to integrate with the BAS. As part of the equipment's configuration, it includes an internal Ethernet switch. This configuration is not normally acceptable on DND telecommunications networks, however it is not explicitly forbidden in the H2 contract documents. When the permanent DND BAS switching equipment was installed, the paint booth BACnet interface went offline. Later, it was determined that the DND/SSC network management switch had disabled the port serving the paint booth due the presence of a switch within the equipment. The wing Shared Services representative has temporarily removed the security routine that locked out this port and the interface is back online. It is noted that if/when the Facnet is integrated with the DWAN, this item will need to be revisited.

POWER MONITORING

This late addition to the project involves the addition of current transducers and a set of energy totalizing routines to the BAS. This work appears generally complete, but is not fully verified. Verification is continuing with cooperation from the Wing Energy Manager.

HYDRONIC FLOW METER ON HX1 GLYCOL LOOP

Prior to installation, this flow meter was damaged and repaired. During the course of commissioning, the meter failed to read consistently. The installing contractor revisited the meter on more than one occasion and it is now showing a stable, consistent trend of values. DCC recommends that this meter be monitored on an ongoing basis, particularly over the course of the warranty period.

4. SUMMARY

Hangar 2 consists of a highly capable and efficient set of systems designed to accommodate routine aircraft maintenance. The commissioning of systems is generally complete and the compilation of close-out documentation is nearing completion.

DCC has continued to monitor the performance of the Hangar since occupancy, and several seasonal issues have been identified. Most of these issues have already been corrected. The remaining issues are discussed above and included on the attached issues log. A final seasonal review of the chilled water system and resolution of all outstanding issues is expected by the summer of 2014.

The Hangar is in full operation and it has met the Owner's Requirements for a purpose-built maintenance facility for Canada's CC-130J aircraft. With ongoing operation and maintenance attention and a few relatively minor improvements, the hangar will continue to efficiently meet the owner's requirements for many years to come.

5. REFERENCES

Reference the Hangar 2 Building Management Manual for further documentation on the commissioned systems.

For a copy of the Building Management Manual or any other questions related to Hangar 2 Commissioning, Contact:

Dan Munroe
Construction Services Team Leader
Defence Construction Canada
8 Wing / CFB Trenton
P.O. Box 1000 Station Forces
Astra ON K0K 3W0
Tel. 613-392-2811 x 7595 / CSN. 86-827-7595
dan.munroe@dcc-cdc.gc.ca

6. APPENDIXES

A1 – Commissioning Plan
A2 – Organizational Chart of the Commissioning Team
A3 – Construction and Functional Performance Checklists
A4 – Manufacturers Test Reports
A5 – Issues Log
A6 – Training Matrix
A7 – BACnet IP/MS-TP Device List
A8 – BAS Screenshot Samples

Commissioning Plan
Addendum One

EME Facility – CFB Trenton

BIRD
CONSTRUCTION COMPANY

Table of Contents

Addendum One

Air Handlers
DX-AHU-3
CU-DX-AHU-1, 2, 3 & 4

Exhaust Fans
EF-6H, EF-6I, EF-7, EF-7H, EF-7I, EF-9, EF-11, EF-12, EF-14, EF-15, EF-16, EF-17, EF-19, EF-20 & EF-23

Supply Fans
SF-1

Unit Heaters
UH-22, 23, 24 & 25
UHEX-1, 2, 3, 4, 5 & 6
UHE-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 & 13

Forced Flow Heaters
FF-1, FF-2 & FF-3

Hydronic Pumps
P-1A, P-1B, P-2A, P-2B, P-3A, P-3B, P-4A, P-4B, P-5A, P-5B, P-6A & P-6B

Plumbing Pumps
P-9, P-10, P-11, P-15 & P-16

POL Pumps & Waste POL Pumps
5W20
ANTI
5W30
15W40
ATF
HF
WO
ATF W
ANT W
W FUEL

Vehicle Vacuum Equipment
Room 1120 & 3003

Overhead Cranes

Q-355 (14).5 Tonne

Duct Heaters

DH-1, 2, 3, 4, 5, 6, 7, 8 & 9

EngA ENGINEERED AIR

TECHNICAL SERVICES REPORT

Date May 30/12	Label Date Jan 24/11	Unit Tag # DX-AHU-3	Serial # M13488 (N3585)
Job Name EME Building		Installing Contractor Quality Mechanical	
Gas or Refrig Company on site			
Tech's Name	Chris Mcdonald	Phone	
Tech's Ticket #	Expiry	Class	Gas Fitter #
OP Check ☒ Startup Assistance ☐	Return Visit ☐		Model No. LM-3-C
Complaint			
Rated Voltage 575 Actual	L1 603	L2 603	L3 602
Wires tight ☐	Remote Wire Size	Voltage Drop	Shielded

SA Rated Volts		RA Rated Volts		Comb Motor Rated Volts	
SA Rated Amps	#1 #2	RA Rated Amps	#1 #2	Rated AMPS	Average AMPS
SA Average Amps	#1 #2	RA Actual Amps	#1 #2	EA Rated AMPS	Average AMPS
Set Screws Tight	Fan ☐	Fuel Connections Tight ☐		Drip Leg ☐	
Pulleys ☐	Bearings ☐	Type of Fuel	Natural Gas ☐	Propane ☐	Oil ☐
Inlet Gas Pressure Static "wc	High Fire "wc	Manifold Rated "wc		Actual "wc	
Fan Controlled By:	High Limit		Aux. H/L		
Noise/Vib Level	Low Velocity A/S		High Velocity A/S		
Low Limit °	AFS On		AFS Off		
L/L Bypass Timer Min.	Design Temperature Rise °		High Fire °		Low Fire °

Combustion Tests	Carbon Monoxide (PPM)	Low	Med.	High
	Oxygen	Low %	Med. %	High %
	Stack Temp	Low °		High °

Venting Info	Side Wall ☐	Category 1 ☐	Category 2 ☐				
Dampers	Open Fully ☐	Close Fully ☐	Minimum Position %	MA SP °			
Exhaust Fan Interlock OK ☐	Remote Panel OK ☐	Caulking OK ☐	Clogged Filter Setpoint "w.c.				
Fire Alarm Interlock OK ☐	Jumpered ☐						
Heating is controlled	DJM ☐	Ctrac ☐	Gtrac1 ☐	Gtrac2 ☐	Htrac ☐	Xtrac ☐	SCR ☐ BO ☐
Above slave to Ctrac ☐	Other ☐ Describe						
Setpoint is °	With override °	Controlled by :					
BURNER BYPASS DAMPER PPA VDC LOW CAP VDC	HIGH CAP VDC						
PROFILE VELOCITY VDC LOW CAP VDC	HIGH CAP VDC	CONSTANT VOLUME HE					
HEAT RECOVERY Wheel ☐	HRP Fixed ☐	HRP tilt ☐	Plate ex ☐	Gycol Loop	Other ☐ Describe		
TRIMED Product ☐ Describe					Attach TriMed Startup Form		

Comments:

Met with Chris from Quality Mechanical on site. They had wanted for us to do a op- check on the unit, when I took a look at the unit I had found that the C-trac-3 had been bypassed and that the unit including the condensing unit for the unit is being controlled by HTS controls. They will also be controlling the dampers as well. The Ambient sensor that was shipped loose and was to be installed by others has not been done. 1-3 F/A contacts have been jumped. 3-4duct high pressure limit contacts have jumped. S/A and R/A VFD contacts have been jumped. As I stated above the stages of cooling are being controlled by others and have not been wired to the unit. The fans are being run by VFD's by others. The unit was left running. I checked and ensured that all of the set screws for the mechanical and electrical were tight.

FIELD HAZARD ASSESSMENT ☒ Comments			
Out of Town Miles	Estimated Air/Hotel/Meal/Car Expense		
Time Traveling 2	Labor Time 1	Travel/Labor cost	Total cost
All doors on unit ☒	Unit left running ☒	If not, why?	
Cooling on back, Check if applicable ☐	Eng A Technician Alex	Office Toronto	

FILL OUT NCR FOR INTERNAL COMMENTS

COOLING SECTION

Refrigerant Type R

	1	2	3	4	5	6	7	8	9	10
Condenser Fan Rated Amps										
Actual Amps										

Condenser Motor Rated Volts ϕ

COND FAN CONTROL	1CFC1	Stage 1 ON C1		PSIG	Stage 1 OFF CO		PSIG
	1CFC2	Stage 2 ON C1		PSIG	Stage 2 OFF CO		PSIG
	2CFC1	Stage 3 ON C1		PSIG	Stage 3 OFF CO		PSIG
	2CFC2	Stage 4 ON C1		PSIG	Stage 4 OFF CO		PSIG

Compressor #	1	2	3	4	5	6	7
Rated Amps							
Fully Loaded Amps							
Head Pressure							
Suction Pressure							
Suction Temperature							
Superheat / AMB Temp	/	/	/	/	/	/	/
Oil Level is OK	☐	☐	☐	☐	☐	☐	☐
Crankcase Heaters ok	☐	☐	☐	☐	☐	☐	☐

Metering device is TX Valve Standard ☐ Electronic ☐ Cap Tube ☐

Condenser Modulating Reheat ☐ Staged Reheat ☐

Liquid Line Solenoid styles Recycling Pumpdown ☐ Single Pump Down ☐ Solenoid Drop ☐

If pump down Shutoff Pressure PSIG | Pump Down Restart Pressure PSIG

MANUAL RESET HP CONTROL CO SP ☐ CI SP ☐ | AUTO RESET LOW LIMIT CO SP ☐ CI SP ☐

CPR ☐ LOW AMBIENT RATED ° SUCTION ACC ☐ RECEIVER ☐

IS RECEIVER BELOW CONDENSING COIL ☐ CAN REFRIGERATION PIPING LAYOUT TRAP OIL ☐

Hot Gas Bypass Begins		PSIG	Hot Gas Bypass Stops		PSIG	
Cooling Changeover Set Point	°	Room Stat @	°	D/A Stat @	°	R/A Stat @ °
Cooling Controlled by:	☐ Other Device - Details					
☐CTRAC2 @	°	With reset @	°	By		Control
☐CTRAC3 @	°	With reset @	°	By		Control

PROPER PROCEDURE FOR COMPRESSOR CHANGE OUT FOLLOWED ☐

Additional Comments:

FILL OUT NCR FOR INTERNAL COMMENTS

EngA ENGINEERED AIR

Pour #1

START-UP RECORD

Unit Serial Number: M134S86CUBX-AHU-1 Date: May 29/12

Model: CUB252.					
All shipping material removed. O.K.					
All fan, bearing and pulley setscrews checked for tightness. O.K					
Incoming power Voltage measurements: O.K.				Phase 1-2	589 V
				Phase 2-3	586 V
				Phase 3-1	586 V
Rotation correct. Good.					
Amperage measurements:	Phase 1	Phase 2	Phase 3		
Supply air blower				Compressor refrigerant pressure measurements	
Return air blower					
Burner motor				Suction	Discharge
Compressor 1	6.9	6.7	6.9	68 psig	215 psig
Compressor 2	6.34	6.5	6.3	66 psig	205 psig
Compressor 3				psig	psig
Compressor 4				psig	psig
Compressor 5				psig	psig
Compressor 6				psig	psig
Compressor 7				psig	psig
Compressor 8				psig	psig
Condenser fan 1	1.1	.99	1.1		
Condenser fan 2	.98	.98	.96	Ambient Temperature: 21°C.	
Condenser fan 3					
Condenser fan 4					
Condenser fan 5					
Condenser fan 6					
Condenser fan 7					
Condenser fan 8					
Electric heat stage 1					
Electric heat stage 2					
Electric heat stage 3					
Electric heat stage 4					
Electric heat stage 5					
Electric heat stage 6					
Electric heat stage 7					
Electric heat stage 8					

Note: Not all units have all of the components listed in the Start-Up Record. Nov 04

Route #2.

Gas line supply pressure:	Off	" W. C.	~~High fire~~	" W. C.
Manifold gas pressure at high fire				" W. C.
All field wiring is complete and installed as per the wiring diagram.	O.K			
Dampers operate as described in the unit function.	O.K			
All controls set at the correct setpoints as indicated in the unit function.	O.K.			

Notes:

A/C START ONLY - HAMILTON SMITH
MAY 29/12.

SUPERHEAT CIR #1 - 9.7° F
CIR #2 - 10.4° F.

CRANKCASE #1 - 1.1 amps
HEATER #2 - .98 amps.

RETURN AIR - 70° F.
SUPPLY AIR - 59.3 ° F.

REFRIGERANT CHARGE CIR #1 - 80# R410A
#2 - 80# R410A

Start-Up Completed By:

Technician: Company: Hamilton Smith Ltd

CLDX-AHU2 - PAGE #2.

Gas line supply pressure:	N/A.	Off	" W. C.	High fire	" W. C.
Manifold gas pressure at high fire					" W. C.
All field wiring is complete and installed as per the wiring diagram.					✓
Dampers operate as described in the unit function.					✓
All controls set at the correct setpoints as indicated in the unit function.					✓

Notes:

R/C START - HAMILTON SMITH LTD.

→ CRANKCASE HTR #1 - 0.10 amp

#2 - 0.11 amp.

- 100% OUTSIDE AIR, NO RETURN.

RETURN AIR TEMP = 24.1°C.

SUPPLY - 13.9°C.

ROB BENNETT. MAY 29/12.

SYSTEM R407C CHARGE - 22 lbs CIR #1

22 lbs - CIR #2.

Start-Up Completed By: Rob Bennett

Technician: Company: Hamilton Smith Ltd.

EngA ENGINEERED AIR

START-UP RECORD

Unit Serial Number: M134888CLEDX - AHU2 Date: May 24/2012

Model: CLEA 112 - 0

All shipping material removed.	O.K	
All fan, bearing and pulley setscrews checked for tightness.	O.K	
Incoming power Voltage measurements:	Phase 1-2	586 V
	Phase 2-3	584 V
	Phase 3-1	588 V
Rotation correct.	CORRECTED ALL.	

Amperage measurements:	Phase 1	Phase 2	Phase 3	Compressor refrigerant pressure measurements	
				Suction	Discharge
Supply air blower					
Return air blower					
Burner motor					
Compressor 1 (Suction Temp 102°F)	6.4	6.35	6.7	78 psig	278 psig
Compressor 2 (Suction Temp 90°F)	6.18	6.16	6.22	81 psig	260 psig
Compressor 3				psig	psig
Compressor 4				psig	psig
Compressor 5				psig	psig
Compressor 6				psig	psig
Compressor 7				psig	psig
Compressor 8				psig	psig
Condenser fan 1	.98	.96	.96		
Condenser fan 2	.93	.90	.92	Ambient Temperature: 80° F	
Condenser fan 3					
Condenser fan 4					
Condenser fan 5					
Condenser fan 6					
Condenser fan 7					
Condenser fan 8					
Electric heat stage 1					
Electric heat stage 2					
Electric heat stage 3					
Electric heat stage 4					
Electric heat stage 5					
Electric heat stage 6					
Electric heat stage 7					
Electric heat stage 8					

Note: Not all units have all of the components listed in the Start-Up Record.

EngA ENGINEERED AIR

START-UP RECORD

Unit Serial Number: M134886CWDX-AH63 Date: May 31/02

Model: CWA92-0

All shipping material removed. O.K.

All fan, bearing and pulley setscrews checked for tightness. O.K.

Incoming power Voltage measurements:

Phase 1-2	584	V
Phase 2-3	589	V
Phase 3-1	585	V

Rotation correct. CORRECTED.

Amperage measurements:	Phase 1	Phase 2	Phase 3	Compressor refrigerant pressure measurements	
				Suction	Discharge
Supply air blower					
Return air blower					
Burner motor					
Compressor 1	5.28	5.26	5.48	106 psig	205 psig
Compressor 2	4.98	5.22	5.23	68 psig	210 psig
Compressor 3				psig	psig
Compressor 4				psig	psig
Compressor 5				psig	psig
Compressor 6				psig	psig
Compressor 7				psig	psig
Compressor 8				psig	psig
Condenser fan 1	1.0	.98	.95		
Condenser fan 2	.98	.97	.98	Ambient Temperature: 22° C	
Condenser fan 3					
Condenser fan 4					
Condenser fan 5					
Condenser fan 6					
Condenser fan 7					
Condenser fan 8					
Electric heat stage 1					
Electric heat stage 2					
Electric heat stage 3					
Electric heat stage 4					
Electric heat stage 5					
Electric heat stage 6					
Electric heat stage 7					
Electric heat stage 8					

Note: Not all units have all of the components listed in the Start-Up Record. Nov 04

CL04-A443 - Page #2.

Gas line supply pressure:	N/A.	Off	" W. C.	High fire	" W. C.
Manifold gas pressure at high fire					" W. C.
All field wiring is complete and installed as per the wiring diagram.					
Dampers operate as described in the unit function.					✓
All controls set at the correct setpoints as indicated in the unit function.					✓

Notes:

A/C Start-up, Hamilton Sunset.

CIRC #1 - Superheat 10.1 °F.
CIRC #2 - Superheat 9.6 °F
CRANKCASE HTR - #1 - 0.10 amps
#2 - 0.10 Amps

INLET AIR - 21.3 °C
SUPPLY AIR - 8.9 °C.

Rob Bennett - May 31/12.

R407 - CIRC #1 - 25#
CIRC #2 - 25#.

Start-Up Completed By: Rob Bennett

Technician: Company: Hamilton Sunset Ltd.

EngA ENGINEERED AIR

START-UP RECORD

Unit Serial Number: M13[illegible]CUDX-A24U4 Date: MAY 29/12

Model: CUEA 143-0

All shipping material removed. OK

All fan, bearing and pulley setscrews checked for tightness. OK

Incoming power Voltage measurements:

Phase 1-2	579 V
Phase 2-3	584 V
Phase 3-1	585 V

Rotation correct. Yes

Amperage measurements:	Phase 1	Phase 2	Phase 3
Supply air blower			
Return air blower			
Burner motor			
Compressor 1	5.4	5.53	5.50
Compressor 2	5.7	5.2	5.6
Compressor 3	5.2	5.2	5.24
Compressor 4			
Compressor 5			
Compressor 6			
Compressor 7			
Compressor 8			
Condenser fan 1	.98	.97	.97
Condenser fan 2	.93	.94	.94
Condenser fan 3			
Condenser fan 4			
Condenser fan 5			
Condenser fan 6			
Condenser fan 7			
Condenser fan 8			
Electric heat stage 1			
Electric heat stage 2			
Electric heat stage 3			
Electric heat stage 4			
Electric heat stage 5			
Electric heat stage 6			
Electric heat stage 7			
Electric heat stage 8			

Compressor refrigerant pressure measurements

	Suction	Discharge
Compressor 1	70 psig	205 psig
Compressor 2	62# psig	200 psig
Compressor 3	66# psig	210# psig
Compressor 4	psig	psig
Compressor 5	psig	psig
Compressor 6	psig	psig
Compressor 7	psig	psig
Compressor 8	psig	psig

Ambient Temperature: 22° C

Note: Not all units have all of the components listed in the Start-Up Record.

Nov 04

CUDX - AHU4 PALM # 2.

Gas line supply pressure:	Off	" W. C.	High fire	" W. C.
Manifold gas pressure at high fire				" W. C.
All field wiring is complete and installed as per the wiring diagram.				✓
Dampers operate as described in the unit function.				✓
All controls set at the correct setpoints as indicated in the unit function.				

Notes:

A/C START - HANNEGAN SMITH LTD. MAY 22/02

SUPERHEAT CIRC #1 = 12 °F
CIRC #2 = 8.9 °F.
CIRC #3. = 8.6 °F.

CRANKCASE HTR - #1 - .11 amps
#2 - .09 amps
#3. - .11 amps

RETURN AIR TEMP. - 73 °F.
SUPPLY AIR TEMP - 51 °F.

REFRIGERANT CHARGE - CIRC #1 - 26 #
R407C - CIRC #2 - 26 #
- CIRC #3 - 26 #.

Start-Up Completed By: ROB RUMBOLT
Technician:

Company: HANNEGAN SMITH LTD.

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB Trenton

UNIT TAG: EF-6H

DATE: 2/28/12

UNIT MANUFACTURER: Cook

MODEL # 135SQIHP

SERIAL # 40150484710100093010411

VFD'S: YES _____ NO ✓ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: Marathon

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS RATED		ACTUAL VOLTS		ACTUAL AMP DRAW	
VOLTS 120	RPM 1725	L1-L2= 118.7		T-1= 5.1	
AMPS 5.5	SF 1.15	L2-L3= _____		T-2= _____	
HORSEPOWER 1/3		L1-L3= _____		T-3= _____	
ACTUAL VOLTS: PHASE-GROUND: L1= _____	L2= _____			L3= _____	

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: [signature]

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115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB Trenton

UNIT TAG: EF-6E

DATE: _____

UNIT MANUFACTURER: Cook

MODEL # 135SQEHP

SERIAL # 4015D4847101001080104 11

VFD'S: YES _____ NO ✓ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: A.O Smith

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	ACTUAL VOLTS	ACTUAL AMP DRAW
VOLTS 120 RPM 1725	L1-L2= 119.8	T-1= 5.5
AMPS 6.4 SF 1.23	L2-L3= _____	T-2= _____
HORSEPOWER 1/2	L1-L3= _____	T-3= _____

ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____ L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: DA

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F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB TRENTON

UNIT TAG: EF-19

DATE: _____

UNIT MANUFACTURER: COOK

MODEL # GN-164

SERIAL # 4015D4847103749 1-11

VFD'S: YES _____ NO ~ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: OEM

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM 1300	L1-L2= 118.7	T-1= .9
AMPS 1.3 SF _____	L2-L3= _____	T-2= _____
HORSEPOWER _____	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: DA

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F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB TRENTON

UNIT TAG: EF-29

DATE: _____

UNIT MANUFACTURER: COOK

MODEL # GN-720

SERIAL # 401SD484710374911R

VFD'S: YES _____ NO ✓ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: OEM

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM 1375	L1-L2= 119.2	T-1= 3.1
AMPS 3.9 SF _____	L2-L3= _____	T-2= _____
HORSEPOWER 196 WATTS	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: DM

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FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB TRENTON

UNIT TAG: EF-11

DATE: _____

UNIT MANUFACTURER: COOK

MODEL # GN-420

SERIAL # 401504847103749113

VFD'S: YES _____ NO ✓ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: OEM

MOTOR MODEL #: — FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	ACTUAL VOLTS	ACTUAL AMP DRAW
VOLTS 120 RPM 1145	L1-L2= 118.7	T-1= 1.6
AMPS 2.2 SF —	L2-L3= _____	T-2= _____
HORSEPOWER 140 VA775	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: AD

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FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB Trenton

UNIT TAG: EF-7H

DATE: 2/28/12

UNIT MANUFACTURER: Cook

MODEL # 70 MH

SERIAL # 401SD4847100001850103 11

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: Baldor

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS
RATED

VOLTS 575 RPM 1725

AMPS 3.7 SF 1.15

HORSEPOWER 3

ACTUAL VOLTS

L1-L2= 604

L2-L3= 606

L1-L3= 609

ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____ L3= _____

ACTUAL AMP DRAW

T-1= 2.4

T-2= _____

T-3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: _____

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115 Norfinch Drive
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FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB TRENTON

UNIT TAG: EF-7I

DATE: 2/28/12

UNIT MANUFACTURER: COOK

MODEL # 70 MH

SERIAL # 4015D4847100001890203 11

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: BALDOR

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 575 RPM 1725	L1-L2= 603	T-1= 2.3
AMPS 3.2 SF 1.15	L2-L3= 607	T-2= _____
HORSEPOWER 3	L1-L3= 604	T-3= _____

ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____ L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: DA

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ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CTB

UNIT TAG: EF.23

DATE:

UNIT MANUFACTURER: Cook

MODEL # 70 SQN-B

SERIAL # 401504847101000035010411

VFD'S: YES ____ NO ✓ RETURN ____ SUPPLY ____ BY OTHERS ____

MOTOR MANUFACTURER: A.O Smith

MOTOR MODEL #: ____ FRAME: ____

SERIAL #: ____ ID #: ____

MOTOR RATINGS RATED		ACTUAL VOLTS	ACTUAL AMP DRAW
VOLTS 120	RPM 1725	L1-L2= 119.2	T-1= 3.8
AMPS 4.5	SF 1.15	L2-L3= ____	T-2= ____
HORSEPOWER ¼		L1-L3= ____	T-3= ____
ACTUAL VOLTS: PHASE-GROUND: L1= ____		L2= ____	L3= ____

OWNER REP:

CONTRACTOR:

HTS TECHNICIAN: DA

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T 416.661.3400
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FANS SUPPLY/RETURN/EXHAUST

PROJECT: Cook

UNIT TAG: ETF 9

DATE: _____

UNIT MANUFACTURER: Cook

MODEL # 165SQN10D

SERIAL # 401SD484710100137010411

VFD'S: YES _____ NO ___/___ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: Tasco

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM 1075	L1-L2= 119.7	T-1= 3.8
AMPS 3.8 SF _____	L2-L3= _____	T-2= _____
HORSEPOWER _____	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: NA

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F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB TORONTO

UNIT TAG: SF-1

DATE: 2/28/12

UNIT MANUFACTURER: COOK

MODEL # 80 SQN-B

SERIAL # 4015D4684710100151010411

VFD'S: YES _____ NO ✓ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: A.O SMITH

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED		**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120	RPM 1725	L1-L2= 118.7	T-1= 4.1
AMPS 4.5	SF 1.15	L2-L3= _____	T-2= _____
HORSEPOWER 1/4		L1-L3= _____	T-3= _____

ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____ L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: DM

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115 Norfinch Dr
Toronto, ON M3N 1W6
T 416.661.3400
F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB Trenton

UNIT TAG: EF-14

DATE: 2/28/12

UNIT MANUFACTURER: Cook

MODEL # 160A17DS

SERIAL # 401SD484710200007010411

VFD'S: YES _____ NO ✓ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: Emerson

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM 1725	L1-L2= 119.1	T-1= 5.3
AMPS 6.0 SF 1.23	L2-L3= _____	T-2= _____
HORSEPOWER 1/3	L1-L3= _____	T-3= _____

ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____ L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: _____

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T 416.661.3400
F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CRB Tilbury

UNIT TAG: EF-15

DATE: _____

UNIT MANUFACTURER: Cook

MODEL # 16A17DB

SERIAL # 401SD484710200018010411

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: Marathon

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM 1725	L1-L2= 120.1	T-1= 5.9
AMPS 7.5 SF _____	L2-L3= _____	T-2= _____
HORSEPOWER 1/2	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____	L2= _____	L3= _____

OWNER REP: _____

CONTRACTOR: [illegible]

HTS TECHNICIAN: [illegible]

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FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB Trenton

UNIT TAG: EF-16

DATE: 2/28/12

UNIT MANUFACTURER: Cook

MODEL # 20A170A

SERIAL # 401SD484710 2000290/0411

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: Emerson

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM 1725	L1-L2= _____	T-1= 5.3
AMPS 6.0 SF _____	L2-L3= _____	T-2= _____
HORSEPOWER 1/3	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: _____

HTS Toronto
[redacted] Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

FANS SUPPLY/RETURN/EXHAUST

PROJECT: CFB TRENTON

UNIT TAG: EF-12

DATE: 2/28/12

UNIT MANUFACTURER: Cook

MODEL # GN-720

SERIAL # 401SD484710 3749114

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: OEM

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM 1375	L1-L2= 118.9	T-1= 2.9
AMPS 3.9 SF _____	L2-L3= _____	T-2= _____
HORSEPOWER 196 Watts	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: RA

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T 416.661.3400
F 416.661.0100
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FANS SUPPLY/RETURN/EXHAUST

PROJECT: CTB Trenton

UNIT TAG: ET-17

DATE: 2/28/17

UNIT MANUFACTURER: Cook

MODEL # GN-720

SERIAL # 4015D4847103749115

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: GM.

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS 120 RPM _____	L1-L2= 118.	T-1= 3.2
AMPS 3.9 SF _____	L2-L3= _____	T-2= _____
HORSEPOWER 196 watts	L1-L3= _____	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: DA

DATA AIR TESTING & BALANCING LTD.
Air & Water Balancing

Feb. 08/13

Hi Chris

I'm not sure what has happened the updated copy of EF-7D and SPF – 1 are in my copy of the latest balancing report

104, Brockville Street Smiths Falls Ontario K7A 3Y5 Phone 613 283 9998
Fax 613 283 9909

DATA AIR
TESTING AND BALANCING LTD.

Project / *Projet*: CFB Trenton

Area Served / *Zone de Serve*:

System / **Systeme**: EF - 7D

Equipment location / *Position d'equipment*: Mezzanine Mechanical Room

Date of test / *Date de l'examen*:

Equipment		Motor / *Moteur*		Fan RPM / *TPM de L'eventail*
MAKE *MARQUE*	Cook	**Make** *Marque*	Marathon	**Design** / *Concu*
MODEL *MODELE*	195CPS	Frame number *No. Du Cadre*	56	
		Horse Power C.V.	3/4	851
SERIAL NUMBER *NO DE SERIE*	401SD48471-0015901	**Required RPM** *TPM Requis*	1725	**Actual** / *Actuel*
		Actual RPM *TPM Actuel*	1745	798

Designed CFM *PCM Concu*	2320	**Actual CFM** *PCM Actuel*	2737
DesignedL/S *L/S Concu*	1095	**Actual L/S** *L/S Actuel*	1292

Electrical Statistics *Statistiques Electriques*	**Required** *Requis*	**Actual** *Actuel*	**Fresh Air**	
Motor Amps *Amp. Du moteur*	0.90	.9 / .8 / .85	Designed CFM	
Phase / *Phase*	3	3	Actual CFM	
Voltage / *Voltage*	575	611 / 610 / 610	Min %	
Overload Protection	N/A	N/A	Economiser size	
Service Factor *Facteur de service*	N/A	1.15	Computer Controlled	

Pulley size in inches *Grandeur de la poulie en pouces*		**Shaft Size in Inches** Grandeur du puits en pouces		**Drive Belts** *Courroies -V*		**Pulley Adjustment** *Ajustement de la poulie*			
Motor *Moteur*	3 1/4	Motor *Moteur*	5/8	Quantity	1	Top		1/4	
Fan Eventail	4 1/2	Fan Eventail	1	Model No No.Modele	A42	3/4		Bottom	X
						Mid		Fixed	

External SP/ *SP Exteme*	Design *Dessin*		Design *Dessin*		Design *Dessin*	
Inches of Water Column / *Colonne d'eau*	**Discharge** Actual	0.040	**Suction** Actual	0.510	**Total** Actual	0.550

C to C 16 1/2	Fan Rotation confirmation Confirmation de direction	X	Filter Condition Condition du filtre	None *Aucun*	X Clean *net*	Dirty *Sale*	Loaded *Plein*

Notes / Remarques

Technician / Technicien: MARK

DATA AIR

TESTING AND BALANCING LTD.

ROUND DUCT TRAVERSE
TRAVERSE DU CONDUIT

Project / *Projet:* **CFB Trenton**

System / *Systeme:* **EF - 7D** **Location** / *Zone:* **T - 1 Mechanical Rm.**

	Duct / *Conduit*			**Required** / *Requis*			**Actual** / *Actuel*	
Size / *Grandeur*	18 "		**FPM** *FPM*	1313		**FPM** *FPM*	1549	
Sq. Ft / Pied Carre	1.77		**CFM** *PCM*	2320		**CFM** *PCM*	2737	
S.P. "W/C	-0.510		**L/S**	1095		**L/S**	1292	

Position	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	1410	1596						
2	1588	1511						
3	1612	1637						
4	1577	1521						
5	1527	1506						
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Remarks / *Remarques:*

Test Date / Date de l'examen February 12, 2013 **Technician** / *Technicien* TIM

2705-27 Northside Road, Ottawa, Ontario K2H 8S1 Tel (613) 727-9924 Fax (613) 727-9572

DATA AIR
TESTING & BALANCING LTD.

AIR OUTLET REPORT
REPORT TESTED BY

Area Served *Zone de Serve*	No.	Size *Grandeur*	Required / *Requis*		Actual / *Actuel*		Notes
			CFM / *PCM*	L/S	CFM / *PCM*	L/S	
SPF-1		20"x16"	995	470	1400	661	
SPF-2		20"x16"	995	470	1570	741	

Notes :

CFB Trenton EME Maintenance Facility
Stairwell Pressurization Fans

Both fans were left high to increase the positive pressure in the stairwells

DATA AIR

TESTING AND BALANCING LTD.

Project / *Projet*	CFB Trenton EME Maintenance Facility
Area Served / *Zone de Serve*	Stairwell
System / **Systeme**	SPF - 01
Equipment location / *Position d'equipment*	Ceiling
Date of test / *Date de l'examen*	Dec./12

Equipment		**Motor** / *Moteur*		**Fan RPM** / *TPM de L'eventail*
MAKE *MARQUE*	Cook	**Make** *Marque*	No	**Design** / *Concu*
MODEL *MODELE*	150SQN	**Frame number** *No. Du Cadre*	Access	
		Horse Power C.V.	1/3	1075
SERIAL NUMBER *NO DE SERIE*	401SD48471-01/0016501	**Required RPM** *TPM Requis*	1075	**Actual** / *Actuel*
		Actual RPM *TPM Actuel*	N/A	N/A

Designed CFM *PCM Concu*	996	**Actual CFM** *PCM Actuel*	1395
DesignedL/S *L/S Concu*	470	**Actual L/S** *L/S Actuel*	658

Electrical Statistics *Statistiques Electriques*	**Required** *Requis*	**Actual** *Actuel*	**Fresh Air**	
Motor Amps *Amp. Du moteur*	No Access		Designed CFM	
Phase / *Phase*			Actual CFM	
Voltage / *Voltage*	115	115	Min %	100%
Overload Protection	N/A		Economiser size	
Service Factor *Facteur de service*	N/A		Computer Controlled	

Pulley size in inches *Grandeur de la poulie en pouces*		**Shaft Size in Inches** Grandeur du pults en pouces		**Drive Belts** *Courroies -V*		**Pulley Adjustment** *Ajustement de la poulie*			
Motor *Moteur*	N/A	Motor *Moteur*	N/A	Quantity	N/A	Top		1/4	
Fan Eventail	N/A	Fan Eventail	N/A	Model No No.Modele	N/A	3/4		Bottom	
						Mid		Fixed	
External SP/ *SP Externe*		Design *Dessin*		Design *Dessin*		Design *Dessin*			
Inches of Water Column / *Colonne d'eau*		**Discharge** Actual		**Suction** Actual	0.350	**Total** Actual	0.350		

C to C	Fan Rotation confirmation Confirmation de direction	X	Filter Condition Condition du filtre	None *Aucun*	X	Clean *net*	Dirty *Sale*	Loaded *Plein*

Notes / Remarques

DIRECT DRIVE

Technician / Technicien

MARK

2705-27 Northside Road, Ottawa, Ontario K2H 8S1 Tel (613) 727-9924 Fax (613) 727-9572

CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
2043	✓	✓	03/27/13	
MECH RM 2				

COMMENTS: FANS A M # HUH-5L
S # N3585H-1-UH-22

UH-22

120V 2.06 A

ACKNOWLEDGED:	DATE
Mechanical Contractor: QUALITY MECH	Date: 03/27/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
2043	✓	✓	03/27/13	
MECH RM 2				

COMMENTS: UH-23 ENG A M# HUH-2L
S# N3585H-1-UH-23
120V 1.56A

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: QUALITY MECH	Date: 03/27/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
1014B	✓	✓	03/27/13	

COMMENTS: ENG A MF HUH-2L SF# N3585H-1-UH-24
~~FE25~~
UH-25 1.47A 120V

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: QUALITY MECH	Date: 03/27/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
1014A	✓	✓	03/27/13	

COMMENTS: ENG A M# ~~HUH-5~~ HUH-1L S#N3585H-1-UH~~32~~ 25
#24 120V 1.21A

ACKNOWLEDGED:	DATE
Mechanical Contractor: QUALITY MECH	Date: 03/27/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	UHEX-1 Temo

NAMEPLATE			
MANUFACTURER	QUELLET	EQUIPMENT NO.	UHEX-1
SERVICE		LOCATION	

UNIT HEATER	ACTUAL		RATED			
Location						
Amperage: Rated/Actual	4.6		5.5			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

M# OHX05036-A-T-A
S# OHX10698

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: Jim Jackiw	8/16/12

CX CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	

NAMEPLATE			
MANUFACTURER	QUEST	EQUIPMENT NO.	UHEX-2
SERVICE		LOCATION	

UNIT HEATER	RATED		ACTUAL			
Location RM 1082						
Amperage: Rated/Actual	5.5		4.6			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

MF# OHX05036-A-T-A

SF# OHX10700

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: JM Jackman DCC	9/9/12

CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	

NAMEPLATE			
MANUFACTURER	QUELLET	EQUIPMENT NO.	UHEX-3
SERVICE		LOCATION	

UNIT HEATER	RATED		ACTUAL			
Location POC RM.						
Amperage: Rated/Actual	10.3 ✓		9.2			
Fan Operation						
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

M# OHX10036-A-T-A

S# OHX10701

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority:	

CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	

NAMEPLATE			
MANUFACTURER	QUELRT	EQUIPMENT NO.	UHEX -4
SERVICE		LOCATION	

UNIT HEATER	RATED		ACTUAL			
Location PAINT BOOTH						
Amperage: Rated/Actual	29.9		27.4			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

M# OHX30036-A-T-A

SF# OHX 10702

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority:	8/9/12

CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	TEMÉ

NAMEPLATE			
MANUFACTURER	QUELLET	EQUIPMENT NO.	UHEX-5
SERVICE		LOCATION	

UNIT HEATER	ACTUAL					DESIGN
Location	PAINT BOOTH					
Amperage: Rated/Actual	4.68 AMPS					5.5
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

MODEL # OHX D5036-ATA

SERIAL # OHX 10697

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	8/9/12
General Contractor/Consultant:	
Commissioning Authority: DCC	8/9/12

CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	

NAMEPLATE			
MANUFACTURER	QUELCRET	EQUIPMENT NO.	UHEX-6
SERVICE		LOCATION	

UNIT HEATER	RATED		ACTUAL			
Location						
Amperage: Rated/Actual	5.5		4.67			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

MF# OHX05036-A-T-A

SF# OHX10694

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: DMacKenzie DCC	8/9/12

CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	TEMÉ

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	DUCATI	EQUIPMENT NO.	UHR-1
SERVICE		LOCATION	1071

UNIT HEATER	RATED		ACTUAL			
Location						
Amperage: Rated/Actual	2.84		2.74			
Fan Operation						
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

SFT 0AS03036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: Jim Mackinnon	5/21/12

CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	Tenio

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	OSBURN	EQUIPMENT NO.	UHE - 2
SERVICE		LOCATION	1123

UNIT HEATER	ACTUAL		RATED			
Location						
Amperage: Rated/Actual	4.48		4.82			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

S# 0A505036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority:	8/21/12

CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	Temo

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	OUTWATT	EQUIPMENT NO.	1122
SERVICE		LOCATION	UHE-3

UNIT HEATER	ACTUAL		RATED			
Location						
Amperage: Rated/Actual	2.67		2.84			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

SH OA503036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: Don Jackson	8/21/12

CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	

NAMEPLATE			
MANUFACTURER	QUELCRET	EQUIPMENT NO.	UHE-4
SERVICE		LOCATION	

UNIT HEATER	ACTUAL		NATCO			
Location						
Amperage: Rated/Actual	7.17		7.23			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

SFF 0A507536

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: Jim Jackson	10/5/12

CX CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	Temp

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	OUELLET	EQUIPMENT NO.	UHE-6
SERVICE		LOCATION	3003 RM.

UNIT HEATER	ACTUAL		RATED			
Location						
Amperage: Rated/Actual	6.9		7.25			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

S. # 0A507536

HEATER IS DAMAGED

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority:	8/21/12

CX CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	TERRE

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	OUELLET	EQUIPMENT NO.	UHE-7
SERVICE		LOCATION	3002

UNIT HEATER	RATED		ACTUAL			
Location						
Amperage: Rated/Actual	2.89		2.65			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

SFF 0SA03036

NO LANACOID

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: Ian Mackintosh	8/21/12

CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	TEMÉ

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	QUELCRAFT	EQUIPMENT NO.	WASH BAY UHE-8
SERVICE		LOCATION	RM 3001

UNIT HEATER	ACTUAL		RATED			
Location						
Amperage: Rated/Actual	2.77		2.89			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:
S # OAS03036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: Tim Jackson	8/21/12

CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	Tesla

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	QUELLET	EQUIPMENT NO.	~~RH~~ UHE-9
SERVICE		LOCATION	RM 2041

UNIT HEATER	RATED		ACTUAL			
Location						
Amperage: Rated/Actual	2.89		2.74			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

S# QAS03036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority:	8/21/12

CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT: FILE No:

NAMEPLATE			
MANUFACTURER	DUNCKLEY	EQUIPMENT NO.	UHE-10
SERVICE		LOCATION	

UNIT HEATER	ACTUAL		RATED			
Location						
Amperage: Rated/Actual	~~7.5~~ 7.04		7.25			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

SH# 0A307536

ACKNOWLEDGED:	DATE:
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: [signature]	Sept. 14 2012

CX CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	Temo

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	QUELLETT	EQUIPMENT NO.	UHE-11
SERVICE		LOCATION	2040

UNIT HEATER	RATED		ACTUAL			
Location						
Amperage: Rated/Actual	4.32		4.18			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

S# OAS05036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: J. Mackintosh	8/24/17

CANADA INC

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	Tempo

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	OUELLETT	EQUIPMENT NO.	UHE-12
SERVICE		LOCATION	4000

UNIT HEATER	RATED		ACTUAL			
Location	4.82					
Amperage: Rated/Actual	~~5.83~~		4.49			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:
SFOAS05036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority:	8/21/12

CX CANADA INC.

PERFORMANCE VERIFICATION
UNIT HEATERS

PROJECT:	
FILE No:	Temo

NAMEPLATE	ELECTRIC UNIT HEATER		
MANUFACTURER	OUELLET	EQUIPMENT NO.	UHE-13
SERVICE		LOCATION	RM 2046

UNIT HEATER	RATED		ACTUAL			
Location						
Amperage: Rated/Actual	4.82		4.42			
Fan Operation	✓					
Valve Operation	N/A					
Control Operation	N/A					

COMMENTS:

SFF 0AS05036

ACKNOWLEDGED:	**DATE:**
Mechanical Contractor:	
General Contractor/Consultant:	
Commissioning Authority: [signature]	8/21/12

CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440 CUH-1

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
STAIRWELL 2	✓	✓	03/20/13	

COMMENTS:
MAKE : ENGINEERED AIR
MODEL : CUH-2
SERIAL : N3585H-1 -CUH-1

120V
HIGH FAN .63A
MED FAN .40A
LOW FAN .20A

ACKNOWLEDGED:	DATE
Mechanical Contractor: CHRIS MACDONALD	Date: 03/20/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440 CUH-2

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
UPPER				
STAIRWELL 2	✓	✓	03/20/13	

COMMENTS: UNIT POWERED OFF BY CONTROLS
MAKE: ENGINEERED AIR
MODEL: CUH-2
SERIAL: N3585H-1-CUH-2
120V. VERIFIED

ACKNOWLEDGED:	DATE
Mechanical Contractor: CHRIS MACDONALD	Date: 03/20/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440 FF-3

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
VESTIBULE 1009	✓	✓	04/25/13	

COMMENTS:
ENGINEERED AIR
MODEL: CUD-2
SERIAL: N3585H-1 FF-3
120V
HIGH FAN .75 A
MED FAN .30 A
LOW FAN .20 A

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: CHRIS MACDONALD	Date: 04/25/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440 FF-2

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
VESTIBULE 1000	✓	✓	03/20/13	

COMMENTS:
MAKE: ENGINEERED AIR
MODEL: EUH-2
SERIAL: N3585H-1-FF-2
120V
HIGH FAN .75A
MED FAN .40A
LOW FAN .20A

ACKNOWLEDGED:	DATE
Mechanical Contractor: CHRIS MACDONALD	Date: 03/20/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

COMMISSIONING FORMS
UNIT HEATERS

PROJECT: E.M.E. Facility
FILE NO: IE100440 FF-1

ROOM #	Heater Operates Correctly	Controls Operate Correctly	Date Checked	Comments
VESTIBULE 1008	✓	✓	04/25/13	

COMMENTS:
MAKE: ENGINEERED AIR
MODEL: CUH-2
SERIAL: N 3585H-1-FF-1
120V.

HIGH FAN	.72 A
MED FAN	.39 A
LOW FAN	.20 A

ACKNOWLEDGED:	DATE
Mechanical Contractor: CHRIS MACDONALD	Date: 04/25/13
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-1A

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	BOILER - 1
Model Number:	L 23	Spec. Reference:	
Serial Number:	1110		
MOTOR DATA:			
Manufacturer:	ARMSTRONG	Panel No:	
Model:	567	Power (V/Ph/Hz):	115
RPM:	1725	Thermal Protection:	
HP:	3/4	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		8.33	7.95	
Pressure (kPa)		NA	NA	
Voltage:	A-B	115/208	115	
	A-C			
	B-C			
Amperage:	A-B	8.8/4.4-4.5	6.7	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility
FILE NO: IE100440 P-1 B

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	BOILER # 2
Model Number:	LZB	Spec. Reference:	
Serial Number:	1110		
MOTOR DATA:			
Manufacturer:	ARMSTRONG	Panel No:	
Model:	S6Z	Power (V/Ph/Hz):	115
RPM:	1725	Thermal Protection:	
HP:	3/4	Fuse Rating:	

START-UP PROCEDURES:	DATE:	COMMENTS:
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	~~✓ N/A~~	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	~~N/A~~	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		8.33	7.95	
Pressure (kPa)		N/A	N/A	
Voltage:	A-B	115/208	115	
	A-C			
	B-C			
Amperage:	A-B	8.8/4.4-4.5	6.8	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-2A

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	BOILER ROOM
Model Number:	4300TC	Spec. Reference:	
Serial Number:	682865		
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	213/5TC	Power (V/Ph/Hz):	575
RPM:	1760	Thermal Protection:	VFD
HP:	7.5	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		9.5	9.3	
Pressure (kPa)		203	215	
Voltage:	A-B	575	575	
	A-C			
	B-C			
Amperage:	A-B	7.22	4.2	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-2B

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	BOILER ROOM
Model Number:	4300 TC	Spec. Reference:	
Serial Number:	682866		
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	213/5TC	Power (V/Ph/Hz):	575
RPM:	1760	Thermal Protection:	VFD
HP:	7.5	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		9.5	9.3	
Pressure (kPa)		203	212	
Voltage:	A-B	575	575	
	A-C			
	B-C			
Amperage:	A-B	7.22	4.1	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility
FILE NO: IE100440 P-3A

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	BOILER ROOM
Model Number:	4380	Spec. Reference:	
Serial Number:	682710		
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	184JM	Power (V/Ph/Hz):	575
RPM:	1755	Thermal Protection:	VFD
HP:	5	Fuse Rating:	

START-UP PROCEDURES:	DATE:	COMMENTS:
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	NA	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		6.3	6.0	
Pressure (kPa)		164	179	
Voltage:	A-B	575	575	
	A-C			
	B-C			
Amperage:	A-B	5.13	3.0	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-3B

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	BOILER ROOM L
Model Number:	4380	Spec. Reference:	
Serial Number:	682711		
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	184JM	Power (V/Ph/Hz):	575
RPM:	1755	Thermal Protection:	VFD
HP:	5	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	NA	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		6.3	6.1	
Pressure (kPa)		164	173	
Voltage:	A-B	575	575	
	A-C			
	B-C			
Amperage:	A-B	5.13	3.0	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-4A

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	MECH RM 5
Model Number:	2B-4360B-01	Spec. Reference:	
Serial Number:	727236		
MOTOR DATA:			
Manufacturer:	BALDOR	Panel No:	
Model:	56C	Power (V/Ph/Hz):	575
RPM:	1725	Thermal Protection:	
HP:	3/4	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		3.5	3.4	
Pressure (kPa)		148	152	
Voltage:	A-B	575	600	
	A-C			
	B-C			
Amperage:	A-B	1.2	1.13	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	DATE
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-4B

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	MECH RM 5
Model Number:	2B-4360B-01	Spec. Reference:	
Serial Number:	727236		
MOTOR DATA:			
Manufacturer:	BALDOR	Panel No:	
Model:	56C	Power (V/Ph/Hz):	
RPM:	1725	Thermal Protection:	
HP:	3/4	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		3.5	3.5	
Pressure (kPa)		148	148	
Voltage:	A-B	575	599	
	A-C			
	B-C			
Amperage:	A-B	1.2	1.16	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-5A

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	MECH RM B 1
Model Number:	4380	Spec. Reference:	
Serial Number:	680659		
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	182SM	Power (V/Ph/Hz):	575
RPM:	1760	Thermal Protection:	
HP:	3	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		2.5	2.5	
Pressure (kPa)		179	193	
Voltage:	A-B	575	601	
	A-C			
	B-C			
Amperage:	A-B	3.23	2.5	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility	
FILE NO: IE100440	P-5B

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	MECH RM # 1
Model Number:	4380	Spec. Reference:	
Serial Number:	680659		
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	182TM	Power (V/Ph/Hz):	575
RPM:	1760	Thermal Protection:	
HP:	3	Fuse Rating:	

START-UP PROCEDURES:	**DATE:**	**COMMENTS:**
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	NA	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		2.5	2.5	
Pressure (kPa)		179	193	
Voltage:	A-B	575	600	
	A-C			
	B-C			
Amperage:	A-B	3.23	2.4	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility
FILE NO: IE100440 P6A

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	WASH-BUILDING
Model Number:	4380	Spec. Reference:	
Serial Number:			
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	145JM	Power (V/Ph/Hz):	575
RPM:	1740	Thermal Protection:	
HP:	1.5	Fuse Rating:	

START-UP PROCEDURES:	DATE:	COMMENTS:
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		2.5	2.5	
Pressure (kPa)		113	110	
Voltage:	A-B	575	600	
	A-C			
	B-C			
Amperage:	A-B	1.62	1.24	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
HYDRONIC PUMPS

PROJECT: E.M.E. Facility
FILE NO: IE100440 P63

GENERAL INFO:			
Manufacturer:	ARMISTRONG	Location:	MECH WASH BUILDING
Model Number:	4380	Spec. Reference:	
Serial Number:			
MOTOR DATA:			
Manufacturer:	WEG	Panel No:	
Model:	145JM	Power (V/Ph/Hz):	575
RPM:	1740	Thermal Protection:	
HP:	1.5	Fuse Rating:	

START-UP PROCEDURES:	DATE:	COMMENTS:
1. Before starting pump, check that cooling water system over-temperature and other protective devices.	✓	
2. After starting pump, check for proper, safe operation.	✓	
3. Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.	✓	
4. Check base for free-floating, no obstruction under base.	N/A	
5. Run-in pumps for 12 continuous hours.	✓	
6. Verify operation of over-temperature and other protective devices under low-and no-flow conditions.	✓	
7. Eliminate air from scroll casing.	✓	
8. Adjust water flow rate through water-cooled bearings.	✓	
9. Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.	N/A	
10. Adjust alignment of piping and conduit to ensure true flexibility at all times.	✓	
11. Eliminate cavitation, flashing and air entrainment.	✓	
12. Adjust pump shaft seals, stuffing boxes, glands.	N/A	
13. Measure pressure drop across strainer when clean and with flow rates as finally set.	✓	
14. Replace seals if pump used to degrease system or if pump used for temporary heat.	N/A	
15. Verify lubricating oil levels.	✓	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		2.5	2.5	
Pressure (kPa)		113	110	
Voltage:	A-B	575	600	
	A-C			
	B-C			
Amperage:	A-B	1.62	1.24	
	A-C			
	B-C			

COMMENTS:

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date:
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility	
FILE NO: IE100440	P-9

GENERAL INFO:			
Manufacturer:	ARMSTRONG	Location:	BOILER ROOM
Model Number:	ARMFLO E11.2B	Spec. Reference:	22 10 10
Serial Number:	182202 - 659		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	120
RPM:	3300	Thermal Protection:	
HP:	1/16 HP	Fuse Rating:	

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	X			Unit Cleaned:	X		
Pressure Gauges Installed:	X			Power Wiring Complete:	X		
Volute Venting Pet Cock Installed:	X			Abnormal Vibrations:		X	
Lubrication Complete:	X			Direction of Rotation Correct:	X		
Strainers Installed and Cecked:	X			Leakage in Packing/Glands:		X	

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A		
Pressure (kPa)		N/A		
Voltage:	A-B	~~2.0A~~	~~1.6A~~	
	A-C			
	B-C			
Amperage:	A-B	2.0A	1.6A	
	A-C			
	B-C			

START UP:	COMMENTS
1. Check Power Supply	cm
2. Check Starter O/L heater size	cm
3. Start pumps, check impeller rotation	cm
4. Check for safe and proper operation	cm
5. Check settings, operation of operating safety and limit controls, over-temperature, audible/visual alarms, other protective devices	N/A
6. Test operation of hands on auto switch	N/A
7. Test operation of alternator	N/A
8. Adjust leakage through water-cooled bearings.	N/A
9. Adjust shaft stuffing boxes.	N/A
10. Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.	N/A
11. Check base for free-floating, no obstructions under base.	N/A
12. Run-in pumps for 12 continuous hours	N/A
13. Check installation, operation of mechanical seals, packing gland type seals. Adjust if necessary.	cm
14. Adjust alignment of piping and conduit to ensure full flexibility	N/A
15. Eliminate causes of cavitations, flashing, air entrainment	cm
16. Measure pressure drop across strainer when clean and with flow rates as finally set.	N/A
17. Replace seals if pump used to degrease system or if pump used for temporary heat	N/A
18. Verify lubricating oil levels	cm
PERFORMANCE VERIFICATION (PV):	
1. Obtain manufacturer's approval, before performing PV, to ensure warranties remain intact.	N/A
2. Application tolerances: 1. Flow: +/- 10% 2. Pressure: Plus 20%, Minus 5%	N/A
3. Open Pump balancing valve fully.	N/A
4. Measure differential pressure (DP) across pump.	
5. Measure amperage and voltage and compare with manufacturer's data sheets and motor nameplate data.	cm
6. If suction is different size than discharge connection, add velocity head correction factor to DP.	N/A
7. Mark this DP on manufacturer's pump curve.	N/A
8. If flow rate is higher than specified, slow close balancing valve until specified DP is reached.	N/A
9. Repeat measurements of amps and volts. Compare with manufacturer's data sheets.	N/A
10. Calculate BHP and compare with nameplate data.	N/A

COMMENTS:

ACKNOWLEDGED:	DATE
Mechanical Contractor: CHRIS MACDONALD	Date: April 4 2013
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

DEFENCE CONSTRUCTION CANADA

WASTE WATER LIFT PUMP VERIFICATION FORM

PROJECT: EME FACILITY
FILE NO: IE100440 Pump #10

GENERAL INFO:		**TAG NO:**	
Manufacturer:	MEYERS	Location:	Rm 1014 (Boiler Room)
Model Number:		Spec. Reference:	22-10-10
Serial Number:			
MOTOR DATA:			
Manufacturer:		Panel No:	Waste Water P10 & 11 Mcc-1
Model:		Power (V/Ph/Hz):	575
RPM:		Thermal Protection:	YES
HP:		Fuse Rating:	

Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Power Wiring Complete:	✓		
Lubrication Complete:	✓			Abnormal Vibrations:		✓	
Unit Cleaned:	✓			Direction of Rotation Correct:	✓		
				Leakage in Packing/Glands:	N/A		
				Check Starter Protective Devices:	✓		
				Proper Flow from Water-cooled Bearings	✓		
				Proper Operation of Selector Switch, Controls and Alarms	✓		

System Verification:	YES	NO	N/A	Remarks
Floats set as per the specifications	✓			
High Level Alarm Checked	✓			
Low Level Alarm Checked				
Overflow Alarm Checked	N/A			
Varible Speeds Checked	N/A			
Pump Rotations Checked	✓			
Pumps Function Simultaneously	✓			

REMARKS/COMMENTS: READINGS
A 1.3
B 1.3
C 1.3

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: Jacqui Quality Mech	Date: 4/27/12
General Contractor / Consultant: Ken Smith Ca Canada	Date: 4/27/12
Commissioning Agent / DCC Representative: Don Mackintosh	Date: 4/27/12

DEFENCE CONSTRUCTION CANADA

WASTE WATER LIFT PUMP VERIFICATION FORM

PROJECT: EME FACILITY
FILE NO: IE100440
Pump #11

GENERAL INFO:		**TAG NO:**	
Manufacturer:	MYERS	Location:	Rm# 1014
Model Number:		Spec. Reference:	22-10-10
Serial Number:			
MOTOR DATA:			
Manufacturer:		Panel No:	Waste Water P10 & 11 MCC-1
Model:		Power (V/Ph/Hz):	575
RPM:		Thermal Protection:	YES
HP:		Fuse Rating:	

Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Power Wiring Complete:	✓		
Lubrication Complete:	✓			Abnormal Vibrations:		✓	
Unit Cleaned:	✓			Direction of Rotation Correct:	✓		
				Leakage in Packing/Glands:		✓	
				Check Starter Protective Devices:	✓		
				Proper Flow from Water-cooled Bearings	✓		
				Proper Operation of Selector Switch, Controls and Alarms	✓		

System Verification:	YES	NO	N/A	Remarks
Floats set as per the specifications	✓			
High Level Alarm Checked	✓			
Low Level Alarm Checked	✓			
Overflow Alarm Checked		N/A		
Varible Speeds Checked		N/A		
Pump Rotations Checked	✓			
Pumps Function Simultaneously	✓			

REMARKS/COMMENTS:
A 1.3
B 1.25
C 1.3

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: Jacqui J Quality Mech.	Date: 4/27/12.
General Contractor / Consultant: [illegible] Canada	Date: 4/27/12
Commissioning Agent / DCC Representative: [illegible]	Date: 4/27/12

DEFENCE CONSTRUCTION CANADA

WASTE WATER LIFT PUMP VERIFICATION FORM

PROJECT: EME FACILITY
FILE NO: IE100440 Pump #15

GENERAL INFO:		**TAG NO:**	
Manufacturer:	MYERS	Location:	Rm# 1014 (Boiler Room)
Model Number:		Spec. Reference:	22.10.10
Serial Number:			
MOTOR DATA:			
Manufacturer:		Panel No:	Waste Water Pump 15+16
Model:		Power (V/Ph/Hz):	575
RPM:		Thermal Protection:	YES
HP:		Fuse Rating:	

Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Power Wiring Complete:	✓		
Lubrication Complete:	✓			Abnormal Vibrations:		✓	
Unit Cleaned:	✓			Direction of Rotation Correct:	✓		
				Leakage in Packing/Glands:		✓	
				Check Starter Protective Devices:	✓		
				Proper Flow from Water-cooled Bearings	✓		
				Proper Operation of Selector Switch, Controls and Alarms	✓		

System Verification:	YES	NO	N/A	Remarks
Floats set as per the specifications	✓			
High Level Alarm Checked	✓			
Low Level Alarm Checked				
Overflow Alarm Checked		N/A		
Varible Speeds Checked		N/A		
Pump Rotations Checked	✓			
Pumps Function Simultaneously				

REMARKS/COMMENTS: READINGS
A 3.9
B 3.9 Pump #15
C 3.7

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: Jacques Quality	Date: 4/27/12
General Contractor / Consultant: Ex Canada	Date: 4/27/12
Commissioning Agent / DCC Representative:	Date: 4/27/12

DEFENCE CONSTRUCTION CANADA

WASTE WATER LIFT PUMP VERIFICATION FORM

PROJECT: EME FACILITY
FILE NO: IE100440 Pump #16

GENERAL INFO:		**TAG NO:**	
Manufacturer:	MYERS	Location:	Rm# 1014 (Boiler Room)
Model Number:		Spec. Reference:	22·10·10
Serial Number:			
MOTOR DATA:			
Manufacturer:		Panel No:	Waste Water Pump 15 & 16
Model:		Power (V/Ph/Hz):	575
RPM:		Thermal Protection:	YES
HP:		Fuse Rating:	

Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Power Wiring Complete:	✓		
Lubrication Complete:	✓			Abnormal Vibrations:		✓	
Unit Cleaned:	✓			Direction of Rotation Correct:	✓		
				Leakage in Packing/Glands:		✓	
				Check Starter Protective Devices:	✓		
				Proper Flow from Water-cooled Bearings	✓		
				Proper Operation of Selector Switch, Controls and Alarms	✓		

System Verification:	YES	NO	N/A	Remarks
Floats set as per the specifications	✓			
High Level Alarm Checked	✓			
Low Level Alarm Checked	✓			
Overflow Alarm Checked	N/A	N/A		
Varible Speeds Checked		N/A		
Pump Rotations Checked	✓			
Pumps Function Simultaneously	✓			

REMARKS/COMMENTS: READINGS
A 3.9
B 4.1
C 3.8

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: Jacqui Quality Mech	Date: 4/27/12
General Contractor / Consultant: Ce Canada	Date: 4/27/12
Commissioning Agent / DCC Representative:	Date: 4/27/12

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility	
FILE NO: IE100440	SW 20

GENERAL INFO:			
Manufacturer:	GRACO	Location:	POL ROOM
Model Number:	DURA FLO 12C 580	Spec. Reference:	~~22 10 10~~
Serial Number:	A230 2946		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:			✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C		↓	
	B-C	↓ NO	YES	

AIR SUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility	
FILE NO: IE100440	ANTI

GENERAL INFO:			
Manufacturer:	GRACO	Location:	POOL ROOM
Model Number:	MONARK L11A	Spec. Reference:	22 10 10
Serial Number:	AX16303		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:			✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES ✓ NO ✓

AIR SUPPLY HOSES TIGHT

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 5w 30

GENERAL INFO:			
Manufacturer:	GRACO	Location:	POL ROOM
Model Number:	DURO FIO 12C 530	Spec. Reference:	~~22 10 10~~
Serial Number:	A2302885		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:			✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIR SUPPLY ✓
HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 15W 40

GENERAL INFO:			
Manufacturer:	GRACO	Location:	POL ROOM
Model Number:	DUROFIO 12C580	Spec. Reference:	~~22 10 10~~
Serial Number:	A2302887		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:			✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIR SUPPLY ✓

HOSE TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 ATF

GENERAL INFO:			
Manufacturer:	GRACO	Location:	POOL ROOM
Model Number:	DURO F10 12C580	Spec. Reference:	~~22 10 10~~
Serial Number:	A2302886		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:			✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIR SUPPLY ✓
HOSE TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility	
FILE NO: IE100440	HF

GENERAL INFO:			
Manufacturer:	GRACO	Location:	POL ROOM
Model Number:	DURA FLO 12C580	Spec. Reference:	~~22 10 10~~
Serial Number:	A2302888		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:			✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)		↓	↓	
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C	✓	✓	

YES NO

AIR SUPPLY ✓

HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 WO

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1080 S
Model Number:	HUSKY 1052	Spec. Reference:	22 10 10
Serial Number:	A0005865		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:	*		✓
Strainers Installed and Cecked:	✓			Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C	✓	✓	

YES NO

SUPPLY AIR HOSES TIGHT ✓ ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 ATF W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1080 S
Model Number:	HUSKY 1050	Spec. Reference:	22 10 10
Serial Number:	A0005852		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓			Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C	↓	↓	
		YES ✓	NO	

AIR SUPPLY HOSE TIGHT

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 WO

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1050
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005863		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility	
FILE NO: IE100440	ATFW

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1050
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005858		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C	✓	✓	
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

ANT W

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1050
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005826		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		~~✓~~	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 W FUEL

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1050
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005831		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility	
FILE NO: IE100440	ATF W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1057
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005861		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

ANT W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1057
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005823		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		NA	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPIY ✓
HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 W FUEL

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1057
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005859		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 WO

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1057
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005820		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		NA	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 W FUEL

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1084 SOUTH
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005851		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 ANT W

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1084 S
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005853		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		DAC	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

ATF W

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1084 S
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005819		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		NA	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 WO

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1084 S
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005828		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 WO

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1084 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005822		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 ATT W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1084 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005864		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		NA	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIR SUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

ANTI W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1084 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005865		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		~~N/A~~	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES ✓	NO ✓	

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

W FUEL

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1084 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005866		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		NA	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

W FUEL

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1080 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005854		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		~~n/a~~	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

ANTI W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1080 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A000058 21		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

CX CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

ATF W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1080 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005857		

MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			
		YES	NO	

AIRSUPPLY ✓
HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 WO

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1080 N
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005862		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		NA	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPLY ✓
HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440

W FUEL

GENERAL INFO:			
Manufacturer:	BRACO	Location:	1080 S
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A0005860		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		✓	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIRSUPPIY ✓
HOSES TIGHT ✓

CANADA

COMMISSIONING FORM
PLUMBING PUMPS

PROJECT: E.M.E Facility
FILE NO: IE100440 ANTI W

GENERAL INFO:			
Manufacturer:	GRACO	Location:	1080 S
Model Number:	HUSKY 1050	Spec. Reference:	~~22 10 10~~
Serial Number:	A00058560		
MOTOR DATA:			
Manufacturer:	N/A	Panel No:	N/A
Model:	N/A	Power (V/Ph/Hz):	N/A
RPM:	N/A	Thermal Protection:	N/A
HP:	N/A	Fuse Rating:	N/A

Pre Start-up Verification:	YES	NO	N/A		YES	NO	N/A
Piping Installation Complete:	✓			Unit Cleaned:	✓		
Pressure Gauges Installed:	✓			Power Wiring Complete:			✓
Volute Venting Pet Cock Installed:			✓	Abnormal Vibrations:		✓	
Lubrication Complete:	✓			Direction of Rotation Correct:			✓
Strainers Installed and Cecked:	✓		N/A	Leakage in Packing/Glands:	✓		

Performance Data:		Specified	Actual	Remarks
Flow Rate (L/s)		N/A	N/A	
Pressure (kPa)				
Voltage:	A-B			
	A-C			
	B-C			
Amperage:	A-B			
	A-C			
	B-C			

YES NO

AIR SUPPLY ✓
HOSES TIGHT ✓

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Clean Air Technologies

TEST CERTIFICATE

TEST REPORT

PROCEDURE

Upon completion of the installation, inspection, pre-start-up and tests shall be conducted by an CLEAN AIR TECHNOLOGIES representative and witnessed by an owner's representative. All defects shall be corrected and the system left in service before CLEAN AIR TECHNOLOGIES personnel finally leaves the site.

This certificate will be completely filled out and signed by both parties. Copies shall be prepared for inspecting authorities, owner and CLEAN AIR TECHNOLOGIES. It is understood the owner's representative's signature in no way prejudices any claim against CLEAN AIR TECHNOLOGIES for faulty material, poor workmanship, or failure to comply with authorities having jurisdiction.

SOLD TO: CFB Trenton EME Facility GPV			
CONTACT NAME: **Quality Mechanical – Chris MacDonald**			
DATE: **May 23, 2012**			
PROJECT NO: **30384**			
TEL NO: **613-969-7403**			
FAX NO: **613-969-8809**			
PUMP MODEL NO: **RB80-SAU**		***SERIAL NO:*** **S-K10502382**	
H.P: **9.6**		CONTROL PANEL VOLTAGE: **600**	
NEMA AMPS: **9.6**	AT **600**	VOLTS	
SURGE POINT: **N/A**	SETPOINT 1: **N/A**	SETPOINT 2: **N/A**	
ACTUAL VOLTAGE:	T1&T2: **593**	T2&T3: **596**	T1&T3: **595**
ACTUAL AMPS (with all inlets closed):	T1: **8.6**	T2: **8.9**	T3: **8.9**
ACTUAL AMPS (with separator door open):	T1: **N/A**	T2: **N/A**	T3: **N/A**
PRESSURE RATING (inches of water gauge): **124" WG Vacuum**			
ACTUAL VACUUM PRESSURE (inches of water gauge) (with all inlets closed): **96.1**			
COUPLING SIZE (OUTBOARD MODELS ONLY): **N/A**			
COUPLING MIS-ALIGNMENT PARALLEL: **N/A**			
COUPLING MIS-ALIGNMENT ANGULAR: **N/A**			
SEPARATOR MODEL NO: 40-204		***SERIAL NO: 28563***	
FILTER MODEL NO: **FIL 057-425P1011**		FILTER SIZE: **5 ¾" X 42.5 LG**	
QUANTITY: 8		FILTER MEDIA: **COTTON SATEEN**	
CLEANING CYCLE: **N/A**	ON TIME: **N/A**	OFF TIME: **N/A**	
AIR PRESSURE IN RESERVOIR (PSI): **N/A**			
NOTES & COMMENTS: System with one hose plugged in pressure at end of hose 63.7" wg. Sound rating @ 3m was 79 dBa			
APPROVED BY:		SIGNATURE:	
TECHNICIAN: Frank Bessette		SIGNATURE: *Frank Bessette*	

IMPORTANT: This form must be filled out and faxed to Clean Air at 866-824-5664 to validate your warranty. Failure to do so may result in loss of warranty.

EUROVAC

www.eurovac.com

Clean Air Technologies

TEST CERTIFICATE

TEST REPORT

PROCEDURE

Upon completion of the installation, inspection, pre-start-up and tests shall be conducted by an CLEAN AIR TECHNOLOGIES representative and witnessed by an owner's representative. All defects shall be corrected and the system left in service before CLEAN AIR TECHNOLOGIES personnel finally leaves the site.

This certificate will be completely filled out and signed by both parties. Copies shall be prepared for inspecting authorities, owner and CLEAN AIR TECHNOLOGIES. It is understood the owner's representative's signature in no way prejudices any claim against CLEAN AIR TECHNOLOGIES for faulty material, poor workmanship, or failure to comply with authorities having jurisdiction.

SOLD TO: CFB Trenton EME Facility - WASH BAY					
CONTACT NAME: **Quality Mechanical – Chris MacDonald**					
DATE: **June 7, 2012**					
PROJECT NO: **30384**					
TEL NO: **613-969-7403**					
FAX NO: **613-969-8809**					
PUMP MODEL NO: **BLO-40E-07502030**			***SERIAL NO:*** **28568**		
H.P: 20			CONTROL PANEL VOLTAGE: **600**		
NEMA AMPS: 18.4	AT **600**		VOLTS		
SURGE POINT: 15		MANUAL SURGE SETPOINT:	85" WG		
ACTUAL VOLTAGE:	T1&T2: **594**		T2&T3: **597**		T1&T3: **595**
ACTUAL AMPS (with all inlets closed):		T1: **12.3**	T2: **13.1**	T3: **12.4**	
ACTUAL AMPS (with separator door open):		T1: **17.9**	T2: **18.4**	T3: **18.1**	
PRESSURE RATING (inches of water gauge): **108" WG Vacuum**					
ACTUAL VACUUM PRESSURE (inches of water gauge) (with all inlets closed): **104**					
COUPLING SIZE (OUTBOARD MODELS ONLY): **7JE**					
COUPLING MIS-ALIGNMENT PARALLEL: **.005**					
COUPLING MIS-ALIGNMENT ANGULAR: **.005**					
SEPARATOR MODEL NO: 40-205			***SERIAL NO: 28563***		
FILTER MODEL NO: **FIL 057-425P1011**			FILTER SIZE: **5 ¾" X 42.5 LG**		
QUANTITY: **8**			FILTER MEDIA: **COTTON SATEEN**		
CLEANING CYCLE: **N/A**	ON TIME:	**N/A**		OFF TIME:	**N/A**
AIR PRESSURE IN RESERVOIR (PSI): **N/A**					
NOTES & COMMENTS: System with one hose plugged in pressure at end of hose 98.6" wg. Sound rating @ 3m was 81dBa					
APPROVED BY:			SIGNATURE:		
TECHNICIAN: Frank Bessette			SIGNATURE: *Frank Bessette*		

IMPORTANT: This form must be filled out and faxed to Clean Air at 866-824-5664 to validate your warranty. Failure to do so may result in loss of warranty.

BIRD
CONSTRUCTION COMPANY

MEETING ATTENDANCE RECORD

Date: 27 April 2012

Meeting: CRANE TRAINING.

Name	Signature
Gary Schwartz	
CRAIG CROZIER	
BRUCE DEARING	
KEITH PARKS	
MARTY ROAM	
Cpl David Young	
GERMAIN FLAMAND	
JERRY RIDGLEY	
R GRIFFITHS	
Potvin	
SCOTT MacDONALD	
MCPL COMEAU	

Regards,

BIRD CONSTRUCTION COMPANY

BIRD
CONSTRUCTION COMPANY

MEETING ATTENDANCE RECORD

Date: 27 April 2012

Meeting: CRANE TRAINING.

Name	Signature
Pascal Charest (MCPL)	
Jesso Craig (CPL)	
ROMEO GOULET MR	
WITNESSED BY: ANDREW McFARLANE / BCC DAVID MASON / BIRD.	

TRAINED ON:

- 12T + 5T BRIDGE CRANES
- 2T + 4T MONO RAILS
- 2T UNDER-RUN
- CHAIN HOISTS.

Regards,

BIRD CONSTRUCTION COMPANY

CRANE TRAINING

SERVICE REPORT

KONECRANES®
Lifting Businesses™

INVOICE TO:	WORK PERFORMED AT:
BIRD CONST	
PHONE: ( )	
CUSTOMER ID #:	CUSTOMER CONTACT:

JOB #:	PO #:	CONTRACT CUSTOMER	YES ☐	NO ☐
ORDER DATE: APRIL 27/12	DELIVERY DATE:	BREAK DOWN	YES ☐	NO ☐
		CRANE S/N:	HOIST S/N:	

REASON FOR SERVICE CALL:

TIME	MILEAGE	EXPENSES	HOURS WORKED TOTALS		
Leave Shop:	Net Km:	Meals:	RT HRS: 8	OT HRS.	DT HRS.
Arrive Job:		Lodging:	@ $	@ $	@ $
Leave Job:	Mileage: @	Other:	X	X	X
Arrive Shop:			# STAFF 3 1	# STAFF	# STAFF
			= $	= $	= $

METHOD OF CORRECTION:

ONSITE CRANE TRAINING — 12000kg
- 5000kg
- 4TON, 2TON MANUFACTURE
2TON SGUR CHAIN HOISTS X4.

QTY.	PART NO. or REF. NO.	MATERIALS (DESCRIPTION)	UNIT PRICE	TOTAL

SERVICE TECHNICIANS(S) SIGNATURE(S)
RICK JOHNSON

JOB: COMPLETE ✓ INCOMPLETE ☐

Customer Signature

Print Name Date

ADDITIONAL WORK REQUIRED: YES ☐ NO ☐

QUOTATION REQUIRED FOR:

ALL ITEMS	YES ☐	NO ☐
SAFETY ITEMS	YES ☐	NO ☐
PRODUCTION ITEMS	YES ☐	NO ☐
AS DIRECTED	YES ☐	NO ☐

I hereby acknowledge that the work detailed above has been completed to my satisfaction and agree to pay the full cost thereof, including any taxes, if applicable, according to the Conditions of Sale on the reverse.

GRAND TOTAL (excluding taxes)

VERIFICATION ONLY
DAVID MASON
BIRD / 27 APRIL 12.

Measurement Canada
An Agency of Industry Canada

Mesures Canada
Un organisme d'Industrie Canada

Central Ontario District
232 Yorktech Drive
Markham, Ontario, L6G 1A6

District central de l'Ontario
232 Yorktech Drive
Markham, Ontario, L6G 1A6

Weight Set No. - № du jeu de poids	Issue date - Emis le	Expiry Date - Date d'expiration
Black	2011-11-10	2012-11-10
Owner - Propriétaire		
Alecttonic Scale Systems Inc.		
Address - Adresse		
1310 Osprey Dr., Unit 3, Ancaster,ON L9G 4V5		
Contact - Personne ressource		Telephone No. - No de téléphone
Rick Dadswell		1-800-268-8230

CERTIFICATE OF DESIGNATION
Gravimetric Standards

I, the undersigned, being authorized by the Minister of Industry to exercise the power of the Minister of Industry pursuant to Section 13 (1) of the *Weights and Measures Act*,

1) hereby certify that the standard or set of standards has been calibrated in accordance with Part III of the Weights and Measures Regulations in relation to a reference standard traceable to the National Measurement Standards of Canada through an unbroken chain of comparisons (the National Measurement Standards are maintained by the Institute of National Measurement Standards (INMS) of the National Research Council of Canada), and

2) designate the said standard or set of standards described below as local standard(s):

CERTIFICAT DE DÉSIGNATION
Étalons gravimétriques

Je soussigné(e), étant autorisé(e) par le ministre d'Industrie à exercer les pouvoirs du ministre d'Industrie conformément à l'article 13 (1) de la *Loi sur les poids et mesures*,

1) certifie par la présente que l'étalon ou jeu d'étalons a été étalonné conformément à la partie III du Règlement sur les poids et mesures et par rapport à un étalon de référence traçable aux étalons nationaux de mesure du Canada par une chaîne ininterrompue de comparaisons (les étalons nationaux de mesures du Canada sont maintenus par l'Institut des étalons nationaux de mesures (IÉNM) du Conseil national de recherches du Canada), et

2) désigne ledit étalon ou jeu d'étalons décris ci-dessous à titre d'étalon(s) local(aux):

Identification Number / Numéro d'identification	Nominal Value / Valeur Nominale	Identification Number / Numéro d'identification	Nominal Value / Valeur Nominale	Identification Number / Numéro d'identification	Nominal Value / Valeur Nominale	Identification Number / Numéro d'identification	Nominal Value / Valeur Nominale
1	500 kg	11	500 kg				
2	500 kg	12	500 kg				
3	500 kg	13	500 kg				
4	500 kg	14	500 kg				
5	500 kg	15	500 kg				
6	500 kg	16	500 kg				
7	500 kg	17	500 kg				
8	500 kg	18	500 kg				
9	500 kg	19	500 kg				
10	500 kg	20	500 kg				

District	Certified by - Certifié par	Designated by: - Désigné par : (Print - Lettres moulées)	Position Title - Titre du poste
Central Ontario District	Donal Gray Calibration Certificate Number - № du certificat d'étalonnage 1345095	Andrew Condos (Signature)	District Manager

Canada

Measurement Canada | Mesures Canada

Fair Measure For All | La mesure juste pour tous

CERTIFICATE of DESIGNATION
Gravimetric Standards
CERTIFICAT de DÉSIGNATION
Étalons gravimétriques

Issued to - Émis à		*Weight set number - Numéro du jeu de poids*
Alectronic Scale Systems Inc.		**Black**
Address - Adresse		*Issue date - Date d'émission*
1310 Osprey Dr.,Unit #3, Ancaster ON, L9G 4V5		**Apr 7 2011**
Contact - Personne-ressource	*Telephone no. - No. de téléphone*	*Expiry date - Date d'expiration*
Rick Dadswell	**1-800-268-8230**	**Apr 7 2012**

I, the undersigned, being authorized by the Minister of Industry to exercise the power of the Minister pursuant to Section 13.(1) of the Weights and Measures Act hereby

a) certify that the standard(s) identified below has (have) been calibrated in accordance with Part III of the Weights and Measures Regulations in relation to Measurement Canada's reference standards which in turn have been calibrated in relation to Canada's prototype for the kilogram whose calibration is traceable to the international prototype for the kilogram maintained by the Bureau International des Poids et Mesures;

b) designate the said standard(s) as (a) local standard(s).

Je, soussigné(e), étant autorisé(e) par le ministre de l' Industrie à exercer les pouvoirs du ministre conformément à l'article 13.(1) de la Loi sur les poids et mesures

a) certifie que l' (les) étalon(s) identifié(s) ci-dessous a (ont) été étalonné(s) conformément à la Partie III du Règlement sur les poids et mesures par rapport aux étalons de référence de Mesures Canada, qui à leur tour ont été étalonnés par rapport au prototype canadien du kilogramme qui est étalonné et retraçable au prototype international du kilogramme conservé au Bureau International des Poids et Mesures.

b) fixe ledit (lesdits) étalon(s) à titre d'étalon(s) local(aux).

Identification No. Numéro d'identification	Nominal Value Valeur nominale	Identification No. Numéro d'identification	Nominal Value Valeur nominale	Identification No. Numéro d'identification	Nominal Value Valeur nominale	Identification No. Numéro d'identification	Nominal Value Valeur nominale
21	500 kg	34	500 kg				
22	500 kg	35	500 kg				
23	500 kg	36	500 kg				
24	500 kg	37	500 kg				
25	500 kg	38	500 kg				
26	500 kg	39	500 kg				
27	500 kg	40	500 kg				
28	500 kg	41	500 kg				
29	500 kg	42	500 kg				
30	500 kg	43	500 kg				
31	500 kg						
32	500 kg						
33	500 kg						

District	*Certificate number - Numéro du certificat*	*Position Title - Titre du poste*
Hamilton	**1344585**	Acting District Manager
Local standard - Étalon local	*Signature*	
M-1		

An Agency of Industry Canada | Un organisme d'Industrie Canada

Canada

Apr 7/11

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440		DATE CHECKED	COMMENTS
1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 201027205318 3 MODEL : XN05050027T

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440		DATE CHECKED	COMMENTS
1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: Hst S/N 201024/2048C72 MODEL: XNC5050027T

ACKNOWLEDGED:	DATE
Mechanical Contractor: [signature]	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility **FILE NO: IE100440**		**DATE CHECKED**	**COMMENTS**
1.	**Running Test:**		
	1. All clearances and alignments are in order.	Apri 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	Apri 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	Apri 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	Apri 26/12	
	5. All protective devices operate satisfactorily.	Apri 26/12	
	6. Each motion of the crane operates satisfactorily.	Apri 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	Apri 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	Apri 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	Apri 26/12	
	4. Test and certify crane to B167 code.	Apri 26/12	

COMMENTS: Ref S/N 201024204EC69 MODEL : XN05050027T

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: [signature]	Date: Apri 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440	DATE CHECKED	COMMENTS

1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 201027205271 MODEL : KNO505C027T

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440		DATE CHECKED	COMMENTS
1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 2010272052728 MODEL: XNE505CC27T

ACKNOWLEDGED:	**DATE**
Mechanical Contractor: [signature]	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440	DATE CHECKED	COMMENTS

1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: Ref S/N 201027205273S Model: XN050500271T

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440	DATE CHECKED	COMMENTS

1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 201027205274 2 MODEL : XW050500277

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440	DATE CHECKED	COMMENTS

1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 201027205279 MODEL : XL050500277

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440		DATE CHECKED	COMMENTS
1.	**Running Test:**		
	1. All clearances and alignments are in order.	Apri 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	Apri 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	Apri 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	Apri 26/12	
	5. All protective devices operate satisfactorily.	Apri 26/12	
	6. Each motion of the crane operates satisfactorily.	Apri 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	Apri 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	Apri 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	Apri 26/12	
	4. Test and certify crane to B167 code.	Apri 26/12	

COMMENTS:

REF S/N 2010272052773 MODEL : KN0505002TT

ACKNOWLEDGED:	DATE
Mechanical Contractor: [signature]	Date: Apri 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440		DATE CHECKED	COMMENTS
1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 201027205278C MODEL : XNO50SC027T

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440	DATE CHECKED	COMMENTS

1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 201027205279T MODEL: KN050500211

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440	DATE CHECKED	COMMENTS

1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: Ref S/N 201027205280C3 Model: XNO5050027T

ACKNOWLEDGED:	**DATE**
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CX CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440		DATE CHECKED	COMMENTS
1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS:

Ref S/N 201027205314S   MODEL: XNO505C027T

ACKNOWLEDGED:	DATE
Mechanical Contractor: [signature]	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

CANADA

COMMISSIONING FORM
CRANES, MONORAILS AND HOIST

PROJECT: EME Facility FILE NO: IE100440	DATE CHECKED	COMMENTS

1.	**Running Test:**		
	1. All clearances and alignments are in order.	April 26/12	
	2. Gearing is sufficiently quiet and lubrication is adequate.	April 26/12	
	3. Operation of each controller switch, contractor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavourable conditions.	April 26/12	
	4. All circuits and interlocks and sequence of operation are correct.	April 26/12	
	5. All protective devices operate satisfactorily.	April 26/12	
	6. Each motion of the crane operates satisfactorily.	April 26/12	
2.	**Load Test: Test each crane motion with hook carrying loads as follows:**		
	1. 25% overload: during this test the specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.	April 26/12	
	2. Rated load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.	April 26/12	
	3. Brake Test: All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.	April 26/12	
	4. Test and certify crane to B167 code.	April 26/12	

COMMENTS: REF S/N 201027205 3176 MODEL: XW0505002T

ACKNOWLEDGED:	DATE
Mechanical Contractor:	Date: April 26/12
General Contractor / Consultant:	Date:
Commissioning Authority:	Date:

COMMISSIONING

&

LOAD TEST PROCEDURE

Customer: BIRD CONSTRUCTION / DND / DCC

W/O No.: 100813 - 0007

Crane Make: KONE CRANES.

Serial No.: A37032

Capacity: 12000 KG

INDEX

0.0 GENERAL INSTRUCTIONS

0.1 The following is intended to serve as KONE standard Procedure for all electric hoists and overhead cranes.

0.2 This test report includes instruction for a variety of equipment, and it should be understood that all information does not apply to all equipment, and should therefore be marked N/A.

0.3 Procedures and tests shall be performed in sequence, as herein enumerated, to minimize the possibility of injury to personnel and damage to equipment. Faults should be corrected as they occur, before proceeding with the next test.

0.4 For safety reasons, personnel and equipment not associated with tests should be kept clear of the testing area

0.5 The crane should never be left while load is suspended from hook.

1.0 SCOPE OF TESTS

1.0.1 To determine the functional efficiency of crane/hoist in meeting the requirements of general and particular specifications applicable to the equipment

1.0.2 To demonstrate the ability of the equipment to perform the working and test duties specified by the manufacturer..

1.0.3 To determine the ability of the equipment to resist component failure by subjecting it to a series of load test operations.

2.0 FUNCTIONAL REQUIREMENTS: DURING THE FOLLOWING TEST PROCEDURES THE CRANE/HOIST SHALL BE INSPECTED AND OPERATED TO PROVE THE STRUCTURAL, MECHANICAL, ELECTRICAL CONDITION, SMOOTHNESS AND EFFICIENCY OF ALL CONTROLS AND MOTIONS.

3.0 RATED LOAD TEST CHECK ( )/RECORD

3.1 HOISTING UNIT

3.1.1 Raise the rated load at slow speed to a distance of 12 inches from the operating floor. Hold the load suspended for a period of 5 minutes. Any change in the height of load at end of this period should be measured and recorded with brake adjustments made. If this test results in a brake adjustment, repeat the above procedure until load remains suspended without deviation. COMPLETED

3.1.2 Raise the rated load, from rest on operating floor, beginning at slow speed then utilizing the entire speed range of the controller and resume slow speed prior to high hook until upper limit cuts out lift. Lower the rated load and again utilizing the entire speed range until the load is slowly placed at rest on floor. Visually observe for smooth operation. COMPLETED

3.2 TROLLEY TRAVEL

3.2.1 With rated load suspended the trolley shall be traversed from one side of bridge to the other utilizing the entire speed range of the controller. Visually observe for smooth operation. COMPLETED

3.2.2 Operating the trolley as per 3.2.1, check the braking action for excessive float, brake squeal or harsh braking. Adjust as required. VFD DRIVEN COMPLETED

3.3 BRIDGE TRAVEL

3.3.1 With rated load suspended, first at one side of bridge and then the other side, the bridge shall be traversed over the entire runway length utilizing the entire speed range of the controller. Visually observe for smooth operation. COMPLETED

CHECK ( )/RECORD

3.3.2 Operating the bridge as per 3.3.1, check the Braking action for excessive float, brake squeal or harsh braking. Adjust as required. VFD DRIVEN COMPLETED.

4.0 OVERLOAD TEST: OVERLOAD SHALL BE (RATED LOAD PLUS 25%) NOTE: FULL MOTOR SPEEDS NEED NOT BE ATTAINED DURING OVERLOAD TESTS.

4.1 HOISTING UNIT

4.1.1 If the hoisting unit is equipped with an overload limit switch, check that limit trips with overload and adjust if need be. The overload limit may then be "jumped" in order to carry out the preceding tests only. COMPLETED

4.1.2 The hoist drum need only be rotated through one revolution to ensure that each tooth of the gearing has been subjected to overload conditions. Observe for smooth operation. COMPLETED

4.2 TROLLEY TRAVEL

4.2.1 The trolley shall be traversed from one side of the bridge to the other. Observe for smooth operation. COMPLETED

4.3 BRIDGE TRAVEL

4.3.1 The bridge need only move enough to ensure that each gear tooth of this motion has been subjected to overload conditions. Observe for smooth operation. COMPLETED

5.0 DEFLECTION TEST:

5.0.1 The deflection of the crane main girder is measured with the trolley at its mid point with the rated load on the hook (NOTE: Not the over load). Prior to this, the crane should be positioned so that the deflection of the runway will not impair the reading. COMPLETED

5/8 "

6.0 FINAL: CHECK ( )/RECORD

4.1.1 The crane should never be left while the load is suspended from the hook. CHECK

6.0.2 Has the hoist overload limit been reconnected? CHECK

4.1.2 COMMENTS:

SIGNATURE: Corey Stuart DATE: APRIL 04/12.

WITNESSED BY: DAVID MASON
WITNESSED BY OX CANADA.

KONECRANES

FIELD COMMISSIONING REPORT

CUSTOMER: BIRD CONSTRUCTION
DND / DCC CFB TRENTON ON.
DATE ISSUED: APRIL 04/12
ISSUED BY:
LATEST REVISION:
CONTACT: DAVE MASON
PHONE: 416 717 - 8664

Crane Information

Capacity: 12000 KG
Serial Number: A37032.
Manufacturer: KONE CRANES.
Installer: CARET INDUSTRIES. / STEVES WELDING.

General Condition	YES	NO	N/A
Paint adequate	✓		
Serial number plate installed	✓		
Capacity labels on bridge, both sides	✓		
Orientation indicator on underside of bridge	✓		
Overhead clearance = >4"	✓		
Side clearance = >2"	✓		
Hoist			
Proper operation of all speeds	✓		
Brake drift at stop acceptable	✓		
Geared upper limit switch functional	✓		
Geared lower limit switch functional	✓		
Cables reeved properly	✓		
Cables lubricated	✓		
Safety latch on hook operable	✓		
Hoist gearcase oil level adequate	✓		
Trolley			
Proper operation of inverter	✓		
Accel/Decel time acceptable	✓		
Trolley end stops match bumpers	✓		
Trolley tracks along bridge beam	✓		
Dual trolley motor rotation sync	✓		
Trolley gearcase oil level adequate	✓		

Bridge	YES	NO	N/A
Proper operation of inverter	✓		
Accel/Decel time acceptable	✓		
Bridge end stops match bumpers	✓		
Bridge tracks along runway	✓		
Dual bridge motor rotation sync	✓		
Bridge gearcase oil level adequate	✓		
Bridge travel limits installed	✓		
Bridge travel limits tested	✓		
Controls			
Directions match button arrangement	✓		
Pushbutton cord suspended at proper level	✓		
Pendant festoon pays out smoothly	✓		
Power festoon push/pull arm sturdy	✓		
Power festoon pays out smoothly	✓		
Mainline collector post sturdy	✓		
Mainline collector shoes tensioned	✓		
Miscellaneous			
Radio/pendant selector prevents dual operation			✓
Pendant and radio e-stop prevents all crane motion	✓		
Customer has been instructed as to proper crane operation			✓
Auxiliary functions operable			✓

Notes: CUSTOMER CRANE OPERATION INSTRUCTION TO BE PERFORMED AT LATER DATE

CUSTOMER: DND/DCC Inspector
DATE: 4/04/12
TECHNICIAN: CAREY STEWART
DATE: APRIL 04/12

The purpose of this report is to provide a final start-up checklist for the crane owner. The technician is to verify all items are acceptable, and review the list with the customer at the crane. Any non-conforming items should be corrected prior to walk through with customer, or duly noted as deficient requiring follow-up.

White Copy - Customer Yellow Copy - File

41 22 00 Cranes

COMMISSIONING

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LOAD TEST PROCEDURE

Customer: BIRD CONSTRUCTION / DND / DCC.

W/O No.: 100 813 -0007

2000 kg. MONORAIL

~~Crane~~ Make: KONE CRANES

Serial No.: HLW 26937

Capacity: 2000 KG.

INDEX

0.0 GENERAL INSTRUCTIONS

0.1 The following is intended to serve as KONE standard Procedure for all electric hoists and overhead cranes.

0.2 This test report includes instruction for a variety of equipment, and it should be understood that all information does not apply to all equipment, and should therefore be marked N/A.

0.3 Procedures and tests shall be performed in sequence, as herein enumerated, to minimize the possibility of injury to personnel and damage to equipment. Faults should be corrected as they occur, before proceeding with the next test.

0.4 For safety reasons, personnel and equipment not associated with tests should be kept clear of the testing area

0.5 The crane should never be left while load is suspended from hook.

1.0 SCOPE OF TESTS

1.0.1 To determine the functional efficiency of crane/hoist in meeting the requirements of general and particular specifications applicable to the equipment

1.0.2 To demonstrate the ability of the equipment to perform the working and test duties specified by the manufacturer..

1.0.3 To determine the ability of the equipment to resist component failure by subjecting it to a series of load test operations.

2.0 FUNCTIONAL REQUIREMENTS: DURING THE FOLLOWING TEST PROCEDURES THE CRANE/HOIST SHALL BE INSPECTED AND OPERATED TO PROVE THE STRUCTURAL, MECHANICAL, ELECTRICAL CONDITION, SMOOTHNESS AND EFFICIENCY OF ALL CONTROLS AND MOTIONS.

3.0 RATED LOAD TEST CHECK ( )/RECORD

3.1 HOISTING UNIT

3.1.1 Raise the rated load at slow speed to a distance of 12 inches from the operating floor. Hold the load suspended for a period of 5 minutes. Any change in the height of load at end of this period should be measured and recorded with brake adjustments made. If this test results in a brake adjustment, repeat the above procedure until load remains suspended without deviation. COMPLETED

3.1.2 Raise the rated load, from rest on operating floor, beginning at slow speed then utilizing the entire speed range of the controller and resume slow speed prior to high hook until upper limit cuts out lift. Lower the rated load and again utilizing the entire speed range until the load is slowly placed at rest on floor. Visually observe for smooth operation. COMPLETED

3.2 TROLLEY TRAVEL

3.2.1 With rated load suspended the trolley shall be traversed from one side of bridge to the other utilizing the entire speed range of the controller. Visually observe for smooth operation. COMPLETED

3.2.2 Operating the trolley as per 3.2.1, check the braking action for excessive float, brake squeal or harsh braking. Adjust as required. COMPLETED
VFD DRIVEN.

3.3 BRIDGE TRAVEL

3.3.1 With rated load suspended, first at one side of bridge and then the other side, the bridge shall be traversed over the entire runway length utilizing the entire speed range of the controller. Visually observe for smooth operation. N/A
MONORAIL

CHECK ( )/RECORD

3.3.2 Operating the bridge as per 3.3.1, check the Braking action for excessive float, brake squeal or harsh braking. Adjust as required. N/A MONORAIL.

4.0 OVERLOAD TEST: OVERLOAD SHALL BE (RATED LOAD PLUS 25%) NOTE: FULL MOTOR SPEEDS NEED NOT BE ATTAINED DURING OVERLOAD TESTS.

4.1 HOISTING UNIT

4.1.1 If the hoisting unit is equipped with an overload limit switch, check that limit trips with overload and adjust if need be. The overload limit may then be "jumped" in order to carry out the preceding tests only. COMPLETED.

4.1.2 The hoist drum need only be rotated through one revolution to ensure that each tooth of the gearing has been subjected to overload conditions. Observe for smooth operation. COMPLETED.

4.2 TROLLEY TRAVEL

4.2.1 The trolley shall be traversed from one side of the bridge to the other. Observe for smooth operation. COMPLETED

4.3 BRIDGE TRAVEL

4.3.1 The bridge need only move enough to ensure that each gear tooth of this motion has been subjected to overload conditions. Observe for smooth operation. N/A MONORAIL

5.0 DEFLECTION TEST:

5.0.1 The deflection of the crane main girder is measured with the trolley at its mid point with the rated load on the hook (NOTE: Not the over load). Prior to this, the crane should be positioned so that the deflection of the runway will not impair the reading. N/A MONORAIL

6.0 FINAL: CHECK ( )/RECORD

4.1.1 The crane should never be left while the load is suspended from the hook. CHECK

6.0.2 Has the hoist overload limit been reconnected? CHECK

4.1.2 COMMENTS:

SIGNATURE: CAREY STEWART. DATE: APRIL 04/12.

WITNESSED BY: DAVID MASON
WITNESSED BY CX CANADA.

KONECRANES

FIELD COMMISSIONING REPORT

CUSTOMER: BIRD CONSTRUCTION
DND / DCC CFB TRENTON, ON

DATE ISSUED: APRIL 04/12
ISSUED BY:
LATEST REVISION:

CONTACT: DAVE MASON.
PHONE: 416-717-8664.

Crane Information

Capacity: 2000 KG MONORAIL Serial Number: HLW 26937.
Manufacturer: KONE CRANES
Installer: CAREY INDUSTRIES / STEVES WELDING

General Condition	YES	NO	N/A
Paint adequate	✓		
Serial number plate installed			✓
Capacity labels on bridge, both sides	✓		
Orientation indicator on underside of bridge			✓
Overhead clearance = >4"	✓		
Side clearance = >2"	✓		

Hoist			
Proper operation of all speeds	✓		
Brake drift at stop acceptable	✓		
Geared upper limit switch functional	✓		
Geared lower limit switch functional	✓		
Cables reeved properly	✓		
Cables lubricated	✓		
Safety latch on hook operable	✓		
Hoist gearcase oil level adequate	✓		

Trolley			
Proper operation of inverter	✓		
Accel/Decel time acceptable	✓		
Trolley end stops match bumpers	✓		
Trolley tracks along bridge beam	✓		
Dual trolley motor rotation sync	✓		
Trolley gearcase oil level adequate	✓		

Bridge	YES	NO	N/A
Proper operation of inverter			✓
Accel/Decel time acceptable			✓
Bridge end stops match bumpers			✓
Bridge tracks along runway			✓
Dual bridge motor rotation sync			✓
Bridge gearcase oil level adequate			✓
Bridge travel limits installed			✓
Bridge travel limits tested			✓

Controls			
Directions match button arrangement	✓		
Pushbutton cord suspended at proper level	✓		
Pendant festoon pays out smoothly			✓
Power festoon push/pull arm sturdy			✓
Power festoon pays out smoothly			✓
Mainline collector post sturdy	✓		
Mainline collector shoes tensioned	✓		

Miscellaneous			
Radio/pendant selector prevents dual operation			✓
Pendant and radio e-stop prevents all crane motion	✓		
Customer has been instructed as to proper crane operation			✓
Auxilliary functions operable			✓

Notes DCC REP REQUESTED SHOW DOWN LIMITS FOR TROLLEY TRAVEL ON MONORAIL.

CUSTOMER: DND/DCC [signature] DATE: 4/4/12
TECHNICIAN: CAREY STEWART. DATE: APRIL 04/12.

The purpose of this report is to provide a final start-up checklist for the crane owner. The technician is to verify all items are acceptable, and review the list with the customer at the crane. Any non-conforming items should be corrected prior to walk through with customer, or duly noted as deficient requiring follow-up.

White Copy - Customer Yellow Copy - File

41 2200 Cranes

COMMISSIONING

&

LOAD TEST PROCEDURE

Customer: BIRD CONSTRUCTION

W/O No.: 100813-0007

Crane Make: KONE CRANES

Serial No.: A37031

Capacity: 2000 KG - UNDERRUN

INDEX

0.0 GENERAL INSTRUCTIONS

0.1 The following is intended to serve as KONE standard Procedure for all electric hoists and overhead cranes.

0.2 This test report includes instruction for a variety of equipment, and it should be understood that all information does not apply to all equipment, and should therefore be marked N/A.

0.3 Procedures and tests shall be performed in sequence, as herein enumerated, to minimize the possibility of injury to personnel and damage to equipment. Faults should be corrected as they occur, before proceeding with the next test.

0.4 For safety reasons, personnel and equipment not associated with tests should be kept clear of the testing area

0.5 The crane should never be left while load is suspended from hook.

1.0 SCOPE OF TESTS

1.0.1 To determine the functional efficiency of crane/hoist in meeting the requirements of general and particular specifications applicable to the equipment

1.0.2 To demonstrate the ability of the equipment to perform the working and test duties specified by the manufacturer..

1.0.3 To determine the ability of the equipment to resist component failure by subjecting it to a series of load test operations.

2.0 FUNCTIONAL REQUIREMENTS: DURING THE FOLLOWING TEST PROCEDURES THE CRANE/HOIST SHALL BE INSPECTED AND OPERATED TO PROVE THE STRUCTURAL, MECHANICAL, ELECTRICAL CONDITION, SMOOTHNESS AND EFFICIENCY OF ALL CONTROLS AND MOTIONS.

3.0 RATED LOAD TEST CHECK ( )/RECORD

3.1 HOISTING UNIT

3.1.1 Raise the rated load at slow speed to a distance of 12 inches from the operating floor. Hold the load suspended for a period of 5 minutes. Any change in the height of load at end of this period should be measured and recorded with brake adjustments made. If this test results in a brake adjustment, repeat the above procedure until load remains suspended without deviation. COMPLETED

3.1.2 Raise the rated load, from rest on operating floor, beginning at slow speed then utilizing the entire speed range of the controller and resume slow speed prior to high hook until upper limit cuts out lift. Lower the rated load and again utilizing the entire speed range until the load is slowly placed at rest on floor. Visually observe for smooth operation. COMPLETED

3.2 TROLLEY TRAVEL

3.2.1 With rated load suspended the trolley shall be traversed from one side of bridge to the other utilizing the entire speed range of the controller. Visually observe for smooth operation. COMPLETED

3.2.2 Operating the trolley as per 3.2.1, check the braking action for excessive float, brake squeal or harsh braking. Adjust as required. COMPLETED

3.3 BRIDGE TRAVEL

3.3.1 With rated load suspended, first at one side of bridge and then the other side, the bridge shall be traversed over the entire runway length utilizing the entire speed range of the controller. Visually observe for smooth operation. COMPLETED.

CHECK ( )/RECORD

3.3.2 Operating the bridge as per 3.3.1, check the Braking action for excessive float, brake squeal or harsh braking. Adjust as required. VFD DRIVEN COMPLETED.

4.0 OVERLOAD TEST: OVERLOAD SHALL BE (RATED LOAD PLUS 25%) NOTE: FULL MOTOR SPEEDS NEED NOT BE ATTAINED DURING OVERLOAD TESTS.

4.1 HOISTING UNIT

4.1.1 If the hoisting unit is equipped with an overload limit switch, check that limit trips with overload and adjust if need be. The overload limit may then be "jumped" in order to carry out the preceding tests only. COMPLETED

4.1.2 The hoist drum need only be rotated through one revolution to ensure that each tooth of the gearing has been subjected to overload conditions. Observe for smooth operation. COMPLETED

4.2 TROLLEY TRAVEL

4.2.1 The trolley shall be traversed from one side of the bridge to the other. Observe for smooth operation. COMPLETED

4.3 BRIDGE TRAVEL

4.3.1 The bridge need only move enough to ensure that each gear tooth of this motion has been subjected to overload conditions. Observe for smooth operation COMPLETED

5.0 DEFLECTION TEST:

5.0.1 The deflection of the crane main girder is measured with the trolley at its mid point with the rated load on the hook (NOTE: Not the over load). Prior to this, the crane should be positioned so that the deflection of the runway will not impair the reading. COMPLETED.

11/16"

6.0 FINAL: CHECK ( )/RECORD

4.1.1 The crane should never be left while the load is suspended from the hook. CHECK

6.0.2 Has the hoist overload limit been reconnected? CHECK.

4.1.2 COMMENTS:

SIGNATURE: CAREY STEWART DATE: APRIL 04/12.

WITNESSED BY: DAVID MASON
WITNESSED BY CX CANADA.

KONECRANES

FIELD COMMISSIONING REPORT

CUSTOMER: BIRD CONSTRUCTION
DND / DCC. CFB TRENTON

DATE ISSUED: APRIL 04/12.

ISSUED BY:

LATEST REVISION:

CONTACT: DAVE MASON.

PHONE: 416 - 717 - 8664

Crane Information

Capacity: 2000 KG

Serial Number: A37031

Manufacturer: KONE CRANE.

Installer: CAREY INDUSTRIES / STEVES WELDING.

General Condition	YES	NO	N/A
Paint adequate	✓		
Serial number plate installed	✓		
Capacity labels on bridge, both sides	✓		
Orientation indicator on underside of bridge	✓		
Overhead clearance = >4"	✓		
Side clearance = >2"	✓		
Hoist			
Proper operation of all speeds	✓		
Brake drift at stop acceptable	✓		
Geared upper limit switch functional	✓		
Geared lower limit switch functional	✓		
Cables reeved properly	✓		
Cables lubricated	✓		
Safety latch on hook operable	✓		
Hoist gearcase oil level adequate	✓		
Trolley			
Proper operation of inverter			✓
Accel/Decel time acceptable			✓
Trolley end stops match bumpers	✓		
Trolley tracks along bridge beam	✓		
Dual trolley motor rotation sync			✓
Trolley gearcase oil level adequate	✓		

Bridge	YES	NO	N/A
Proper operation of inverter	✓		
Accel/Decel time acceptable	✓		
Bridge end stops match bumpers	✓		
Bridge tracks along runway	✓		
Dual bridge motor rotation sync	✓		
Bridge gearcase oil level adequate	✓		
Bridge travel limits installed	✓		
Bridge travel limits tested	✓		
Controls			
Directions match button arrangement	✓		
Pushbutton cord suspended at proper level	✓		
Pendant festoon pays out smoothly	✓		
Power festoon push/pull arm sturdy	✓		
Power festoon pays out smoothly	✓		
Mainline collector post sturdy	✓		
Mainline collector shoes tensioned	✓		
Miscellaneous			
Radio/pendant selector prevents dual operation			✓
Pendant and radio e-stop prevents all crane motion	✓		
Customer has been instructed as to proper crane operation			✓
Auxilliary functions operable			✓

Notes: CUSTOMER CRANE OPERATION INSTRUCTION.
TO BE PERFORMED AT LATTER DATE.

CUSTOMER: DND/DCC

DATE: 4/4/12

TECHNICIAN: CAREY STEWART

DATE: APRIL 04/12.

The purpose of this report is to provide a final start-up checklist for the crane owner. The technician is to verify all items are acceptable, and review the list with the customer at the crane. Any non-conforming items should be corrected prior to walk through with customer, or duly noted as deficient requiring follow-up.

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41 2200 Cranes

COMMISSIONING

&

LOAD TEST PROCEDURE

Customer: BIRD CONSTRUCTION/DND DCC.

W/O No.: 100 813 -0007

4000 KG. MONORAIL
~~Crane~~ Make: KONE CRANES

Serial No.: HLW 26699

Capacity: 4000 KG

INDEX

0.0 GENERAL INSTRUCTIONS

0.1 The following is intended to serve as KONE standard Procedure for all electric hoists and overhead cranes.

0.2 This test report includes instruction for a variety of equipment, and it should be understood that all information does not apply to all equipment, and should therefore be marked N/A.

0.3 Procedures and tests shall be performed in sequence, as herein enumerated, to minimize the possibility of injury to personnel and damage to equipment. Faults should be corrected as they occur, before proceeding with the next test.

0.4 For safety reasons, personnel and equipment not associated with tests should be kept clear of the testing area

0.5 The crane should never be left while load is suspended from hook.

1.0 SCOPE OF TESTS

1.0.1 To determine the functional efficiency of crane/hoist in meeting the requirements of general and particular specifications applicable to the equipment

1.0.2 To demonstrate the ability of the equipment to perform the working and test duties specified by the manufacturer..

1.0.3 To determine the ability of the equipment to resist component failure by subjecting it to a series of load test operations.

2.0 FUNCTIONAL REQUIREMENTS: DURING THE FOLLOWING TEST PROCEDURES THE CRANE/HOIST SHALL BE INSPECTED AND OPERATED TO PROVE THE STRUCTURAL, MECHANICAL, ELECTRICAL CONDITION, SMOOTHNESS AND EFFICIENCY OF ALL CONTROLS AND MOTIONS.

3.0 RATED LOAD TEST CHECK ( )/RECORD

3.1 HOISTING UNIT

3.1.1 Raise the rated load at slow speed to a distance of 12 inches from the operating floor. Hold the load suspended for a period of 5 minutes. Any change in the height of load at end of this period should be measured and recorded with brake adjustments made. If this test results in a brake adjustment, repeat the above procedure until load remains suspended without deviation. COMPLETED

3.1.2 Raise the rated load, from rest on operating floor, beginning at slow speed then utilizing the entire speed range of the controller and resume slow speed prior to high hook until upper limit cuts out lift. Lower the rated load and again utilizing the entire speed range until the load is slowly placed at rest on floor. Visually observe for smooth operation. COMPLETED

3.2 TROLLEY TRAVEL

3.2.1 With rated load suspended the trolley shall be traversed from one side of bridge to the other utilizing the entire speed range of the controller. Visually observe for smooth operation. COMPLETED

3.2.2 Operating the trolley as per 3.2.1, check the braking action for excessive float, brake squeal or harsh braking. Adjust as required. COMPLETED
VFD DRIVEN.

3.3 BRIDGE TRAVEL

3.3.1 With rated load suspended, first at one side of bridge and then the other side, the bridge shall be traversed over the entire runway length utilizing the entire speed range of the controller. Visually observe for smooth operation. N/A
MONORAIL.

CHECK ( )/RECORD

3.3.2 Operating the bridge as per 3.3.1, check the Braking action for excessive float, brake squeal or harsh braking. Adjust as required. N/A MONORAIL.

4.0 OVERLOAD TEST: OVERLOAD SHALL BE (RATED LOAD PLUS 25%) NOTE: FULL MOTOR SPEEDS NEED NOT BE ATTAINED DURING OVERLOAD TESTS.

4.1 HOISTING UNIT

4.1.1 If the hoisting unit is equipped with an overload limit switch, check that limit trips with overload and adjust if need be. The overload limit may then be "jumped" in order to carry out the preceding tests only. COMPLETED

4.1.2 The hoist drum need only be rotated through one revolution to ensure that each tooth of the gearing has been subjected to overload conditions. Observe for smooth operation. COMPLETED.

4.2 TROLLEY TRAVEL

4.2.1 The trolley shall be traversed from one side of the bridge to the other. Observe for smooth operation. COMPLETED. MONORAIL

4.3 BRIDGE TRAVEL

4.3.1 The bridge need only move enough to ensure that each gear tooth of this motion has been subjected to overload conditions. Observe for smooth operation. N/A MONORAIL.

5.0 DEFLECTION TEST:

5.0.1 The deflection of the crane main girder is measured with the trolley at its mid point with the rated load on the hook (NOTE: Not the over load). Prior to this, the crane should be positioned so that the deflection of the runway will not impair the reading. N/A MONORAIL

6.0 FINAL: CHECK ( )/RECORD

4.1.1 The crane should never be left while the load is suspended from the hook. CHECK

6.0.2 Has the hoist overload limit been reconnected? CHECK.

4.1.2 COMMENTS:

SIGNATURE: CAREY STEWART. DATE: APRIL 04/12

WITNESSED BY: DAVID MASON
WITNESSED BY CX CANADA

KONECRANES

FIELD COMMISSIONING REPORT

CUSTOMER: BIRD CONSTRUCTION
DND / DCC CFB TRENTON.

DATE ISSUED: APRIL 04/12
ISSUED BY:
LATEST REVISION:

CONTACT: DAVE MASON.
PHONE: 416- 717-8664

Crane Information

Capacity: 4000 KG MONORAIL. Serial Number: HLW 2666 99
Manufacturer: KONE CRANES.
Installer: CAREY INDUSTRIES / STEVES WELDING.

General Condition	YES	NO	N/A
Paint adequate	✓		
Serial number plate installed	✓		✓
Capacity labels on bridge, both sides	✓		
Orientation indicator on underside of bridge			✓
Overhead clearance = >4"	✓		
Side clearance = >2"	✓		
Hoist			
Proper operation of all speeds	✓		
Brake drift at stop acceptable	✓		
Geared upper limit switch functional	✓		
Geared lower limit switch functional	✓		
Cables reeved properly	✓		
Cables lubricated	✓		
Safety latch on hook operable	✓		
Hoist gearcase oil level adequate	✓		
Trolley			
Proper operation of inverter	✓		
Accel/Decel time acceptable	✓		
Trolley end stops match bumpers	✓		
Trolley tracks along bridge beam	✓		
Dual trolley motor rotation sync	✓		
Trolley gearcase oil level adequate	✓		

Bridge	YES	NO	N/A
Proper operation of inverter			✓
Accel/Decel time acceptable			✓
Bridge end stops match bumpers			✓
Bridge tracks along runway			✓
Dual bridge motor rotation sync			✓
Bridge gearcase oil level adequate			✓
Bridge travel limits installed			✓
Bridge travel limits tested			✓
Controls			
Directions match button arrangement	✓		
Pushbutton cord suspended at proper level	✓		
Pendant festoon pays out smoothly			✓
Power festoon push/pull arm sturdy			✓
Power festoon pays out smoothly			✓
Mainline collector post sturdy	✓		
Mainline collector shoes tensioned	✓		
Miscellaneous			
Radio/pendant selector prevents dual operation			✓
Pendant and radio e-stop prevents all crane motion	✓		
Customer has been instructed as to proper crane operation			✓
Auxilliary functions operable			✓

Notes DCC REP REQUESTED SLOW DOWN LIMITS FOR TROLLEY TRAVEL ON MONORAIL.

CUSTOMER: DND CC / T MACKENZIE DATE: 4/4/12
TECHNICIAN: CAREY STEWART. DATE: APRIL 04/12.

The purpose of this report is to provide a final start-up checklist for the crane owner. The technician is to verify all items are acceptable, and review the list with the customer at the crane. Any non-conforming items should be corrected prior to walk through with customer, or duly noted as deficient requiring follow-up.

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41 22 00 Cranes

COMMISSIONING

&

LOAD TEST PROCEDURE

Customer: BIRD CONSTRUCTION / DND DCC

W/O No.: 100 813-0007

Crane Make: KONE CRANES

Serial No.: A 37033

Capacity: 5000 KG. BRIDGE CRANE.

INDEX

0.0 GENERAL INSTRUCTIONS

0.1 The following is intended to serve as KONE standard Procedure for all electric hoists and overhead cranes.

0.2 This test report includes instruction for a variety of equipment, and it should be understood that all information does not apply to all equipment, and should therefore be marked N/A.

0.3 Procedures and tests shall be performed in sequence, as herein enumerated, to minimize the possibility of injury to personnel and damage to equipment. Faults should be corrected as they occur, before proceeding with the next test.

0.4 For safety reasons, personnel and equipment not associated with tests should be kept clear of the testing area

0.5 The crane should never be left while load is suspended from hook.

1.0 SCOPE OF TESTS

1.0.1 To determine the functional efficiency of crane/hoist in meeting the requirements of general and particular specifications applicable to the equipment

1.0.2 To demonstrate the ability of the equipment to perform the working and test duties specified by the manufacturer..

1.0.3 To determine the ability of the equipment to resist component failure by subjecting it to a series of load test operations.

2.0 FUNCTIONAL REQUIREMENTS: DURING THE FOLLOWING TEST PROCEDURES THE CRANE/HOIST SHALL BE INSPECTED AND OPERATED TO PROVE THE STRUCTURAL, MECHANICAL, ELECTRICAL CONDITION, SMOOTHNESS AND EFFICIENCY OF ALL CONTROLS AND MOTIONS.

3.0 RATED LOAD TEST — CHECK ( )/RECORD

3.1 HOISTING UNIT

3.1.1 Raise the rated load at slow speed to a distance of 12 inches from the operating floor. Hold the load suspended for a period of 5 minutes. Any change in the height of load at end of this period should be measured and recorded with brake adjustments made. If this test results in a brake adjustment, repeat the above procedure until load remains suspended without deviation.

COMPLETED

3.1.2 Raise the rated load, from rest on operating floor, beginning at slow speed then utilizing the entire speed range of the controller and resume slow speed prior to high hook until upper limit cuts out lift. Lower the rated load and again utilizing the entire speed range until the load is slowly placed at rest on floor. Visually observe for smooth operation.

COMPLETED

3.2 TROLLEY TRAVEL

3.2.1 With rated load suspended the trolley shall be traversed from one side of bridge to the other utilizing the entire speed range of the controller. Visually observe for smooth operation.

COMPLETED.

3.2.2 Operating the trolley as per 3.2.1, check the braking action for excessive float, brake squeal or harsh braking. Adjust as required.

V.F.D. DRIVEN
COMPLETED

3.3 BRIDGE TRAVEL

3.3.1 With rated load suspended, first at one side of bridge and then the other side, the bridge shall be traversed over the entire runway length utilizing the entire speed range of the controller. Visually observe for smooth operation.

COMPLETED.

CHECK ( )/RECORD

3.3.2 Operating the bridge as per 3.3.1, check the Braking action for excessive float, brake squeal or harsh braking. Adjust as required. VFD DRIVEN COMPLETED.

4.0 OVERLOAD TEST: OVERLOAD SHALL BE (RATED LOAD PLUS 25%) NOTE: FULL MOTOR SPEEDS NEED NOT BE ATTAINED DURING OVERLOAD TESTS.

4.1 HOISTING UNIT

4.1.1 If the hoisting unit is equipped with an overload limit switch, check that limit trips with overload and adjust if need be. The overload limit may then be "jumped" in order to carry out the preceding tests only. COMPLETED

4.1.2 The hoist drum need only be rotated through one revolution to ensure that each tooth of the gearing has been subjected to overload conditions. Observe for smooth operation. COMPLETED.

4.2 TROLLEY TRAVEL

4.2.1 The trolley shall be traversed from one side of the bridge to the other. Observe for smooth operation. COMPLETED.

4.3 BRIDGE TRAVEL

4.3.1 The bridge need only move enough to ensure that each gear tooth of this motion has been subjected to overload conditions. Observe for smooth operation. COMPLETED.

5.0 DEFLECTION TEST:

5.0.1 The deflection of the crane main girder is measured with the trolley at its mid point with the rated load on the hook (NOTE: Not the over load). Prior to this, the crane should be positioned so that the deflection of the runway will not impair the reading. COMPLETED

3/4"

6.0 FINAL: CHECK ( )/RECORD

4.1.1 The crane should never be left while the load is suspended from the hook. CHECK.

6.0.2 Has the hoist overload limit been reconnected? CHECK

4.1.2 COMMENTS:

SIGNATURE: CHREY STEWART. DATE: APR/L 04/12

WITNESSED BY: DAVID MASON
WITNESSED BY CX CANADA.

KONECRANES

FIELD COMMISSIONING REPORT

CUSTOMER: BIRD CONSTRUCTION. DND / DCC CFB TRENTON, ON.

DATE ISSUED: APRIL 04/12.

ISSUED BY:

LATEST REVISION:

CONTACT: DAVE MASON.

PHONE: 416-717-8664.

Crane Information

Capacity: 5000 KG. Serial Number: A37033

Manufacturer: KONECRANES

Installer: CAREY INDUSTRIES / STEVES WELDING.

General Condition	YES	NO	N/A
Paint adequate	✓		
Serial number plate installed	✓		
Capacity labels on bridge, both sides	✓		
Orientation indicator on underside of bridge	✓		
Overhead clearance = >4"	✓		
Side clearance = >2"	✓		
Hoist			
Proper operation of all speeds	✓		
Brake drift at stop acceptable	✓		
Geared upper limit switch functional	✓		
Geared lower limit switch functional	✓		
Cables reeved properly	✓		
Cables lubricated	✓		
Safety latch on hook operable	✓		
Hoist gearcase oil level adequate	✓		
Trolley			
Proper operation of inverter	✓		
Accel/Decel time acceptable	✓		
Trolley end stops match bumpers	✓		
Trolley tracks along bridge beam	✓		
Dual trolley motor rotation sync	✓		✓
Trolley gearcase oil level adequate	✓		

Bridge	YES	NO	N/A
Proper operation of inverter	✓		
Accel/Decel time acceptable	✓		
Bridge end stops match bumpers	✓		
Bridge tracks along runway	✓		
Dual bridge motor rotation sync	✓		
Bridge gearcase oil level adequate	✓		
Bridge travel limits installed	✓		
Bridge travel limits tested	✓		
Controls			
Directions match button arrangement	✓		
Pushbution cord suspended at proper level	✓		
Pendant festoon pays out smoothly	✓		
Power festoon push/pull arm sturdy	✓		
Power festoon pays out smoothly	✓		
Mainline collector post sturdy	✓		
Mainline collector shoes tensioned	✓		
Miscellaneous			
Radio/pendant selector prevents dual operation			✓
Pendant and radio e-stop prevents all crane motion	✓		
Customer has been instructed as to proper crane operation			✓
Auxilliary functions operable			✓

Notes: CRANE OPERATION INSTRUCTION TO BE PERFORMED AT LATER DATE.

CUSTOMER: DND/DCC J Mackenzie DATE: 4/4/12

TECHNICIAN: CAREY STEWART DATE: APRIL 04/12

The purpose of this report is to provide a final start-up checklist for the crane owner. The technician is to verify all items are acceptable, and review the list with the customer at the crane. Any non-conforming items should be corrected prior to walk through with customer, or duly noted as deficient requiring follow-up.

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41 22 00 Cranes

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB TRENTON MAINT

UNIT TAG: DH-1

DATE: JAN 17/13

UNIT MANUFACTURER: THERMOLEC

MODEL #: 57-CTPX

SERIAL #: 236662-001

VFD'S: YES / NO / RETURN / SUPPLY / BY OTHERS /

MOTOR MANUFACTURER: /

MOTOR MODEL #: / FRAME: /

SERIAL #: / ID #: /

MOTOR RATINGS

RATED

VOLTS / RPM /

RATED AMPS 3.84 SF

~~HORSEPOWER~~ KW 4KW heater

ACTUAL VOLTS

L1-L2= 601

L2-L3= 604

L1-L3= 606

ACTUAL AMP DRAW

T-1= 3.7

T-2=

T-3=

ACTUAL VOLTS: PHASE-GROUND: L1= / L2= / L3=

OWNER REP:

CONTRACTOR:

HTS TECHNICIAN: DON'

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB TRENTON

UNIT TAG: DH-2

DATE: JAN 17/13

UNIT MANUFACTURER: ~~Greenheck~~ Thermolec

MODEL # SF-CTPX

SERIAL # 236662-002

VFD'S: YES ✓ NO ✓ RETURN ____ SUPPLY ____ BY OTHERS ____

MOTOR MANUFACTURER: ____

MOTOR MODEL #: ____ FRAME: ____

SERIAL #: ____ ID #: ____

MOTOR RATINGS

RATED	ACTUAL VOLTS	ACTUAL AMP DRAW
VOLTS ✓ RPM ✓	L1-L2= 600	T-1= 4.1
Rated AMPS 4.32 SF ____	L2-L3= 604	T-2= ____
~~HORSEPOWER~~ 6 kw 4.5 Kw Heater	L1-L3= 606	T-3= ____

ACTUAL VOLTS: PHASE-GROUND: L1= ____ L2= ____ L3= ____

OWNER REP: ____

CONTRACTOR: ____

HTS TECHNICIAN: DW

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB TRENTON

UNIT TAG: DH-3

DATE: JAN 17/13

UNIT MANUFACTURER: Thermolec

MODEL # ST-CTPX

SERIAL # 236662-003

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: _____

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	ACTUAL VOLTS	ACTUAL AMP DRAW
VOLTS _____ RPM _____	L1-L2= 601	T-1= 5.4
RATED AMPS 5.76 SF _____	L2-L3= 602	T-2= _____
~~HORSEPOWER~~ kW 6 kW Heater	L1-L3= 604	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: DW

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115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB Trenton Maint

UNIT TAG: DH-4

DATE: Jan 17/13

UNIT MANUFACTURER: Thermolec

MODEL # ST-CTPA

SERIAL # 23662-004

VFD'S: YES ____ NO ____ RETURN ____ SUPPLY ____ BY OTHERS ____

MOTOR MANUFACTURER: ____

MOTOR MODEL #: ____ FRAME: ____

SERIAL #: ____ ID #: ____

MOTOR RATINGS

RATED

VOLTS ____ RPM ____

AMPS Rated 1.5 SF ____

HORSEPOWER 1.5 kw Heater

ACTUAL VOLTS

L1-L2= 604

L2-L3= 606

L1-L3= 608

ACTUAL AMP DRAW

T-1= 1.4

T-2= ____

T-3= ____

ACTUAL VOLTS: PHASE-GROUND: L1= ____ L2= ____ L3= ____

OWNER REP: ____

CONTRACTOR: ____

HTS TECHNICIAN: Dan

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB TRENTON

UNIT TAG: DH-5

DATE: JAN 17/13

UNIT MANUFACTURER: Thermolec

MODEL # ST-CTPX

SERIAL # 236662-005

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: _____

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	ACTUAL VOLTS	ACTUAL AMP DRAW
VOLTS _____ RPM _____	L1-L2= 601	T-1= 2.3
AMPS 2.88 (Rated) SF _____	L2-L3= 603	T-2= _____
~~HORSEPOWER~~ KW 3 KW Heater	L1-L3= 606	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____	L2= _____	L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: Don

HTS Toronto
115 Nonfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB Trenton

UNIT TAG: DH-6

DATE: JAN 17/13

UNIT MANUFACTURER: Thermitec

MODEL # GT-CTQX

SERIAL # 236662-006

VFD'S: YES ____ NO ____ RETURN ____ SUPPLY ____ BY OTHERS ____

MOTOR MANUFACTURER: ____

MOTOR MODEL #: ____ FRAME: ____

SERIAL #: ____ ID #: ____

MOTOR RATINGS

RATED

VOLTS ____ RPM ____

AMPS 2.5 (RATED) SF ____

HORSEPOWER 3 KW (KW) heater

ACTUAL VOLTS

L1-L2= 601

L2-L3= 602

L1-L3= 605

ACTUAL AMP DRAW

T-1= 2.1

T-2= ____

T-3= ____

ACTUAL VOLTS: PHASE-GROUND: L1= ____ L2= ____ L3= ____

OWNER REP: ____

CONTRACTOR: ____

HTS TECHNICIAN: Don

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB TRENTON

UNIT TAG: DH-7

DATE: JAN 17/13

UNIT MANUFACTURER: Thermolec

MODEL # ST-CTPX

SERIAL # 236662-007

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: _____

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS _____ RPM _____	L1-L2= 601	T-1= 1.4
Rated AMPS 1.54 SF _____	L2-L3= 603	T-2= _____
~~HORSEPOWER~~ kw 2 Kw heater	L1-L3= 606	T-3= _____

ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____ L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: Dan

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB TRENTON

UNIT TAG: DH-8

DATE: JAN 17/13

UNIT MANUFACTURER: Thermolec

MODEL # ST-CTPX

SERIAL # 23666 2-008

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: _____

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS _____ RPM _____	L1-L2= 603	T-1= 16.5
Rated AMPS 17.28 SF _____	L2-L3= 607	T-2= _____
~~HORSEPOWER~~ kW 18 kW heater	L1-L3= 606	T-3= _____

ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____ L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: _____

HTS Toronto
115 Norfinch Drive
Toronto, ON M3N 1W8
T 416.661.3400
F 416.661.0100
ontario.htseng.com

Duct Heater Start Up

PROJECT: CFB Trenton

UNIT TAG: DH-9

DATE: JAN 17/13

UNIT MANUFACTURER: Thermotec

MODEL # 37-CTPX

SERIAL # 23662-009

VFD'S: YES _____ NO _____ RETURN _____ SUPPLY _____ BY OTHERS _____

MOTOR MANUFACTURER: _____

MOTOR MODEL #: _____ FRAME: _____

SERIAL #: _____ ID #: _____

MOTOR RATINGS

RATED	**ACTUAL VOLTS**	**ACTUAL AMP DRAW**
VOLTS _____ RPM _____	L1-L2= 601	T-1= 15.5
RATED AMPS 17.28 SF _____	L2-L3= 603	T-2= _____
HORSEPOWER _____	L1-L3= 606	T-3= _____
ACTUAL VOLTS: PHASE-GROUND: L1= _____ L2= _____		L3= _____

OWNER REP: _____

CONTRACTOR: _____

HTS TECHNICIAN: Dan

National Defence / Défense nationale

2105-5-17-1268 (Industrial Security)

06 September, 2017

Luc Boulanger
DGLEPM - DLP 7-2-3
101 Col By Drive
Ottawa, Ontario
K1A 0K2

SECURITY REQUIREMENTS CHECK LIST (SRCL)
FOR CD 201756A1012196

References: A. SRCL 201756A1012196, 01 September 2017
B. National Defence Security Orders and Directives, Chapter 8

1. The SRCL at ref A has been reviewed, and the applicable departmental security guide has been attached for your consideration. The guide outlines the appropriate departmental security instructions necessary for the protection of Classified/Protected information/assets that are related to this contract.

2. The original SRCL must be attached as ANNEX A to the PWGSC/DND contract document. On page one, paragraph one of the contract document, reference is to be made to the SRCL. **No changes** to the SRCL are permitted without prior consultation with Director Defence Security Operations – Industrial Security.

3. Additional inquiries regarding the SRCL may be directed to my Contract Security Analyst, Sasa Medjovic, 613-996-0286.

for D. Murray
SRCL Team Leader
Director Defence Security Operation
613-996-0274

Enclosure(s): 1

Canada

Government of Canada / Gouvernement du Canada

Contract Number / Numéro du contrat
'2017-56 (A1-012196)
Security Classification / Classification de sécurité
Unclassified

SECURITY REQUIREMENTS CHECK LIST (SRCL)
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)

PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE

1. Originating Government Department or Organizati
Ministère ou organisme gouvernemental d'origine NRC / DND

2. Branch or Directorate / Direction générale ou Direction
Construction

3. a) Subcontract Number / Numéro du contrat de sous-traitance

3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant

4. Brief Description of Work / Brève description du travail

Pilot project to install smart building technology in parallel with the building automation system, on military bases in Canada.

5. a) Will the supplier require access to Controlled Goods? Le fournisseur aura-t-il accès à des marchandises contrôlées?	✓ No / Non	☐ Yes / Oui
5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?	✓ No / Non	Yes / Oui
6. Indicate the type of access required / Indiquer le type d'accès requis		
6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS? (Specify the level of access using the chart in Question 7. c) (Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)	✓ No / Non	Yes / Oui
6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.	No / Non	✓ Yes / Oui
6. c) Is this a commercial courier or delivery requirement with no overnight storage? S'agit-il d'un contrat de messagerie ou de livraison commerciale sans entreposage de nuit?	✓ No / Non	Yes / Oui

7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès

Canada	NATO / OTAN	Foreign / Étranger
7. b) Release restrictions / Restrictions relatives à la diffusion		
No release restrictions Aucune restriction relative à la diffusion Not releasable À ne pas diffuser Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays :	All NATO countries Tous les pays de l'OTAN Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays :	No release restrictions Aucune restriction relative à la diffusion Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays :

7. c) Level of information / Niveau d'information

Canada	NATO	Foreign / Étranger
PROTECTED A / PROTÉGÉ A	NATO UNCLASSIFIED / NATO NON CLASSIFIÉ	PROTECTED A / PROTÉGÉ A
PROTECTED B / PROTÉGÉ B	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	PROTECTED B / PROTÉGÉ B
PROTECTED C / PROTÉGÉ C	NATO CONFIDENTIAL / NATO CONFIDENTIEL	PROTECTED C / PROTÉGÉ C
CONFIDENTIAL / CONFIDENTIEL	NATO SECRET / NATO SECRET	CONFIDENTIAL / CONFIDENTIEL
SECRET / SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	SECRET / SECRET
TOP SECRET / TRÈS SECRET		TOP SECRET / TRÈS SECRET
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT)		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT)

PART A *(continued)* / PARTIE A *(suite)*

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets? — No ✓ / Non — Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?
If Yes, indicate the level of sensitivity:
Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets? — No ✓ / Non — Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?

Short Title(s) of material / Titre(s) abrégé(s) du matériel :
Document Number / Numéro du document :

PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

✓	RELIABILITY STATUS COTE DE FIABILITÉ	CONFIDENTIAL CONFIDENTIEL	SECRET SECRET	TOP SECRET TRÈS SECRET
	TOP SECRET– SIGINT TRÈS SECRET – SIGINT	NATO CONFIDENTIAL NATO CONFIDENTIEL	NATO SECRET NATO SECRET	COSMIC TOP SECRET COSMIC TRÈS SECRET
	SITE ACCESS ACCÈS AUX EMPLACEMENTS			

Special comments:
Commentaires spéciaux :

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.
REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work? — No ✓ / Non — Yes / Oui
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?

If Yes, will unscreened personnel be escorted? — No ✓ / Non — Yes / Oui
Dans l'affirmative, le personnel en question sera-t-il escorté?

PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)

INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises? — No ✓ / Non — Yes / Oui
Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?

11. b) Will the supplier be required to safeguard COMSEC information or assets? — No ✓ / Non — Yes / Oui
Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?

PRODUCTION

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises? — No ✓ / Non — Yes / Oui
Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?

INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data? — No ✓ / Non — Yes / Oui
Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS?

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency? — No ✓ / Non — Yes / Oui
Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale?

PART C - *(continued)* / PARTIE C - *(suite)*

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.
Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form **online** (via the Internet), the summary chart is automatically populated by your responses to previous questions.
Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

SUMMARY CHART / TABLEAU RÉCAPITULATIF

Category / Catégorie	PROTECTED / PROTÉGÉ			CLASSIFIED / CLASSIFIÉ			NATO				COMSEC				
	A	B	C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	NATO CONFIDENTIAL / NATO CONFIDENTIEL	NATO SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	PROTECTED / PROTÉGÉ A	PROTECTED / PROTÉGÉ B	PROTECTED / PROTÉGÉ C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRES SECRET
Information / Assets Renseignements / Biens															
Production															
IT Media / Support TI															
IT Link / Lien électronique															

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?
La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

☑ No / Non ☐ Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".
Dans l'affirmative, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?
La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

☑ No / Non ☐ Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).
Dans l'affirmative, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquer qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).

PART D - AUTHORIZATION / PARTIE D - AUTORISATION

13. Organization Project Authority / Chargé de [illegible] de l'organisme

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature
Luc Boulanger	Mechanical Engineer	

Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
613-922-8778		luc.boulanger3@forces.gc.ca	2017-08-31

14. Organization Security Authority / Responsable de la sécurité de l'organisme

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature
Sasa Medjovic - DDSO - Industrial Security	Senior Security Analyst	

Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
Tel: 613-995-0286		E-mail: sasa.medjovic@forces.gc.ca	2017-Sept 06

15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached?
Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?

No / Non ☐ Yes / Oui ☑

16. Procurement Officer / Agent d'approvisionnement

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature
Collin Long	Procurement Officer	

Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
613-993-0431	613-991-3297	Collin.Long@nrc-cnrc.gc.ca	Sept. 11, 2017

17. Contracting Security Authority / Autorité contractante en matière de sécurité

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature

Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date

Security Guide To 201756A1012196

- The only Security Requirement for this contract is that personnel working on this procurement require, as a minimum, a **RELIABILITY STATUS** before access to a secure site is granted. Contractor personnel working on DND sites shall abide by the National Defence Security Orders and Directives as well as any Information Technology publications that may apply. DND Unit Security Supervisors are responsible to brief Contractor employees on these policies and any other security instructions/policies as required. Foreign Contractors will abide by their Governments' national security regulations and/or bilateral agreements MOU.

- Prior to allowing access to secure premises, confirmation of Contractor personnel's security clearances must be forwarded on a Visit Clearance Request through the International Industrial Security Division (IISD) of Public Works & Government Services Canada (PWGSC) for approval and bear the name of this contract/project/program/contract number and the Project Officer.

- At no time will the contractor personnel be allowed to have any access to CLASSIFIED/PROTECTED data/documentation/systems and assets.

- Subcontracts containing security requirements are prohibited without the prior written authority of CISD/PWGSC.

DND Personnel:

DDSO-Industrial Security, is the contact person for information pertaining to security concerns identified in this procurement.

Industrial Personnel:

The Company Security Officer (CSO) or alternate may contact CISD/PWGSC for information pertaining to security concerns identified in this procurement. Foreign Suppliers shall direct security related inquiries to their responsible National Security Authority/Designated Security Authority (NSA/DSA), and shall adhere to instructions issued by their responsible NSA/DSA.