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**SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION**

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

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

Comments - Commentaires

Vendor/Firm Name and Address

Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution

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K1A 0S5

Title - Sujet JTAC VTS & In-Service Support Joint Terminal Attack Controller Virtual Training System (JTAC VTS)	
Solicitation No. - N° de l'invitation W8486-228446/A	Amendment No. - N° modif. 004
Client Reference No. - N° de référence du client W8486-228446	Date 2022-05-03
GETS Reference No. - N° de référence de SEAG PW-\$\$QT-017-28635	
File No. - N° de dossier 017qt.W8486-228446	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM Eastern Daylight Saving Time EDT on - le 2022-06-08 Heure Avancée de l'Est HAE	
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Edwards-Letellier, Sophia	Buyer Id - Id de l'acheteur 017qt
Telephone No. - N° de téléphone (343) 543-7073 ()	FAX No. - N° de FAX () -
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:	

Instructions: See Herein

Instructions: Voir aux présentes

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

Request for Proposal (RFP) Amendment 004 is issued to respond to questions received during the Solicitation period.

1. Amendment 001 was issued to update RFP Volume 1 and Volume 2 Resulting Contract clause JTAC VTS – ISS R&O.
 2. Amendment 002 was issued to clarify that there is no solicitation labelled attachment 007 and update attachments 002 and 009.
 3. The first set of questions 1 to 13 were answered via RFP amendment 003.
-

Question 14:

In a number of sections, Accreditation is mentioned. In some of those sections, it is stated that the system must meet the requirements so that it can be accredited (See for example, 1.2.1, 1.2.2, A1.7.1.2) but other sections state that the system must be accredited (see for example, A1.3.1.1).

Does the delivered system need to have been previously accredited, or is accreditation to happen after delivery?

If the latter, and understanding that the contractor will be responsible for ensuring that the system is accreditable, who will be responsible for actual accreditation of the system?

Answer 14:

Bidders must demonstrate as part of their proposal that they have delivered this capability as an accredited system IAW the JTAC MOA.

The actual accreditation is done by the NATO steering committee in concert with DND, at a later date after the delivery and acceptance of the capability by DND.

Question 15:

Reference: 004 English Attachment_3-pricing tables

The Pricing Tables is locked for several of the boxes that actually require the bidder's input.

Specifically:

- (1) Table 1 - In Service Support boxes I13 to I17 are locked.
- (2) Table 2 - Additional Work Requirements labour category O26 to O32.

Request PSPC to review and re-release the 004 English Attachment 3 - Pricing Tables.

Answer 15:

PSPC has reviewed and unlocked the aforementioned fields. See attached updated Pricing table labelled Revised 004 English Attachment 3_pricing Tables.

Question 16:

As we reviewed the documents in regards of the Gagetown 1 Static Joint Terminal Attack Controller Virtual Systems, it is mentioned a dome and a classroom setting.

Is the requirement for a Dome, or a classroom or both?

Answer 16:

In accordance with section 1.5.1 of the Statement of Work, Canada intends to procure 1 static system JTAC VTS to be delivered and install to 5 CDSB Gagetown. Per section 1.2.3 of the Statement of work (page A-7/230). The initial JTAC VTS solution will require the design, development, production and delivery of the static classroom version.

Question 17:

In Gagetown Artillery School, what is the allocated dimensions of the space for the simulator?

Answer 17:

In accordance with section 1.4.1 of the Statement of Work, the JTAC VTS solution must be installed and able to function within existing CAF infrastructure, they will be installed in the same rooms and have access to the same facilities as the IFFS. The JTAC VTS is constrained by this infrastructure. JTAC VTS static installations must not require modifications to be made to the existing infrastructure.

Question 18:

For the deployable or portable devices, how the capabilities/specifications differ from the static simulator?

Answer 18:

Both deployable and portable devices must meet the same capabilities and specifications as the static simulator.

Question 19:

In order to ensure that we have all the documents for the response to this solicitation, would it be possible to provide a contact that our technical team can talk directly and ask specific questions.

Answer 19:

No, Canada is unable to provide the contact information of the technical team at this time. In order to maintain the integrity of the procurement process all questions must be directed to the Contracting Authority.

Question 20:

Reference: ATTA001 document, on page "A - 52 / 230" it states:

1.4 Constraints

1.4.1 The JTAC VTS static systems will replace the IFFS systems at RCAS and at the Regiments. They will be installed in the same rooms and have access to the same facilities as the IFFS. The JTAC VTS is constrained by this infrastructure. JTAC VTS static installations must not require modifications to be made to the existing infrastructure.

This Word version of the SRS was published from the DOORS JTAC VTS SRS module. The module's objects (requirements statements) were derived from:

a. the original IFFS SOW/SOR.

b. the original RFP SOW ANNEX A, Appendix 1 – Functional Requirements

Solicitation No. - N° de l'invitation
W8486-228446/A
Client Ref. No. - N° de réf. du client
W8486-228446

Amd. No. - N° de la modif.
004
File No. - N° du dossier

Buyer ID - Id de l'acheteur
017QT
CCC No./N° CCC - FMS No./N° VME

Are you able to provide the bolded documents in **a & b**, the "IFFS SOW" and the "RFP SOW ANNEX A, Appendix 1 - Functional Requirements"? We believe, those documents that would possibly answer most of the technical questions.

Answer 20:

Per request, see attached copies of the original IFFS SOW/SOR and the RFP SOW ANNEX A, Appendix 1 – Functional Requirements provided as background information.



IFFS RFP
SOW_SOR_Append

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

ANNEX A
TO: W8486-100463
DATED: 17 December 2009

STATEMENT OF WORK (SOW)

FOR A

INDIRECT FIRE AND FORWARD AIR CONTROLLER

(IF and FAC) TRAINER

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STATEMENT OF WORK

1.0 SCOPE

1.1 Requirement

1.1.1 The Department of National Defence (DND) has a requirement for quantity eight (8) Indirect Fire and Forward Air Controller (IF and FAC) Trainers (5 static and 3 Portable) to replace the in-service Indirect Fire Trainer (IFT) systems.

1.2 Purpose

1.2.1 The purpose of this SOW is to outline the details of the requirement for the supply of items and services to meet the IF and FAC Trainer requirement.

1.3 Background

1.3.1 In the modern military environment of resource, ammunition and fiscal constraints, live fire training is not readily available for all trainees. Simulation has become an integral aspect of the training system, providing the bridge between theory and live fire application. An IF and FAC Trainer would allow certification practice and skill maintenance for trained FACs without the cost associated with real aircraft and ammunition.

1.4 Scope of Work

1.4.1 The contractor shall adapt, fabricate, verify, deliver, test and install IF and FAC Trainers to meet the requirements of this SOW. The contractor shall also be responsible for the initial training of personnel on the IF and FAC Trainer and for other related items and services as detailed herein. After contract award, the contractor shall have sole responsibility for providing an IF and FAC Trainer that meets the requirements of the attached Functional Requirements (Appendix 1).

2.0 APPLICABLE DOCUMENTS

2.1 Applicability

2.1.1 The following documents are supportive of this SOW and shall be considered as supplemental information if not specifically referred to in the body of this SOW. The version of each document that forms part of this SOW shall be the version current on the date of the issuance of the request for proposal unless otherwise specifically stated herein. In the event of a conflict between the documents referred below and the contents of this SOW, the contents of this SOW shall take precedence. The contractor shall be responsible for obtaining commercially available specifications and standards.

2.2 DND Documents

- | | | |
|----|---------------------|---|
| a. | C-01-000-001/AG-001 | Specification Authoring, Publishing & Distribution System (APDS) |
| b. | C-01-100-100/AG-006 | Specification Writing, Format And Production Of Technical Publications; |
| c. | D-01-100-200/SF-000 | Preparation of Equipment Data Summaries; |
| d. | D-01-100-203/SF-000 | Preparation of Operating Instructions; |
| e. | D-02-006-008/SG-001 | National Defence Standard, The Design Change, Deviation and Waiver. |

2.3 Other Documents

- | | | |
|----|----------------|--|
| a. | ISO 9001: 2000 | Quality management systems – Requirements; and |
|----|----------------|--|

b. ISO 9660:1988

Information processing - Volume and file structure of
CD-ROM for information interchange.

3.0 GENERAL

3.1 Security of Work

3.1.1 The work and documentation prepared by the contractor as it applies to the IF and FAC Trainer shall be UNCLASSIFIED.

3.2 Priority of Documents

3.2.1 This SOW, when reconciled with the contents of the contractor's technical proposal and any clarification found necessary for DND approval, shall become the governing document and establish the acceptance criteria for purposes of the contract. This SOW shall take precedence over any subsidiary specifications referenced herein and shall provide the agreed basis for performance and inspection of the work under the contract.

3.3 Design Change and Deviation

3.3.1 Following contract award, any changes in the scope of the work as specified in the SOW, the contractor's proposal or the Acceptance Criteria established therein, shall be subject to the design change procedure as outlined in D-02-006-008/SG-001 National Defence Standard Design Change, Deviation And Waiver Procedure. Design Change Requests shall include the proposed changes to the approved proposal or SOW and shall delineate the provisions for alteration to any other documentation prepared under the contract.

3.3.2 Deliverables

a. Design Change Requests

3.4 Not Used

3.5 Refurbishment

3.5.1 The Contractor shall be responsible for the refurbishment of equipment supplied until formally accepted. Refurbishment shall consist of the repair or replacement of equipment items damaged or unduly worn during shipment, installation, evaluation demonstrations, etc., and the correction of faulty or incomplete workmanship prior to commencement of the warranty period.

3.6 Technical Authority

3.6.1 The TA for this requirement is Mr. Kevin Bradt, DCSEM 7-4, telephone (819) 997-9825 fax (613) 994-4246. The address for correspondence by mail is :

National Defence Headquarters
MGEN Georges R Pearkes Bldg
101 Col. By Drive
Ottawa, ON
K1A 0K2
ATTN: DCSEM 7-4, Mr. K Bradt

The E-mail address is Kevin.Bradt@forces.gc.ca

Courier Address

The address for courier delivery is:

National Defence Headquarters
MGEN Georges R Pearkes Bldg
45 Sacré-Coeur Boul,

Gatineau QC
J8X 1C6
ATTN: DCSEM 7-4, Mr. K Bradt

3.7 Government Supplied Materiel (GSM)

3.7.1 For production DND will not provide any GSM.

3.8 Government Furnished Equipment (GFE)

3.8.1 For production DND will not provide any GFE.

3.9 Government Furnished Information (GFI)

3.9.1 Information to be provided by DND is as specified throughout this SOW and the Appendices.

3.10 Not Used

3.11 Document Approval Process

3.11.1 The procedure for approval of Contractor submitted documents is as follows:

- a. Contractor submits document;
- b. TA provides formal written comments to the Contractor within 20 working days of receipt of the document at the TA's office;
- c. the document and comments are discussed at an appropriate Progress Review Meeting (PRM) if required; and
- d. the Contractor prepares the final version of the document and submits it for final acceptance.

3.12 Identification of Proprietary Items

3.12.1 The contractor shall identify any hardware and software proprietary items which will be used during the development of the IF and FAC Trainer and / or incorporated into the final production IF and FAC Trainer. In addition, during the course of the contract, any additional proprietary items to be used in the development and / or incorporated into the final production IF and FAC Trainer shall be identified to the TA prior to its use. The TA shall have final approval for the use of any proprietary items after contract award. Proprietary items are those items that can only be purchased through one supplier or manufacturer and for which no substitute exists.

3.12.2 Deliverables:

- a. List of Proprietary Items

3.13 Rights to Deliverables

3.13.1 The contractor shall define the rights of both DND and themselves as applicable to hardware items, software modules and the IF and FAC Trainer as a whole.

3.13.2 Deliverables:

- a. Right to Deliverables

3.14 Contractor Point of Contact

3.14.1 The contractor shall appoint one person to be the point of contact with the TA. Normal day-to-day activities concerning this SOW shall be conducted between the contractor point of contact and the TA. The name and contact information must be supplied to the TA.

3.14.2 Deliverables:

- a. Point of Contact

4.0 PROJECT MANAGEMENT

4.1 Project Organization

4.1.1 The contractor shall establish an effective project management organization for the duration of the IF and FAC Trainer contract.

4.1.2 **Project Manager (PM)**- The contractor shall appoint a Project Manager (PM) for the duration of the contract and shall identify him/her in the proposal. The PM's duties in relation to the project shall include the following:

- a. provide overall direction and coordination of all aspects of the project; and
- b. liaise with the Contracting Authority and TA representatives to provide visibility that all project elements are proceeding on schedule and are meeting the requirements of the SOW and specifications.

4.1.3 **Project Team Leaders** - The Contractor shall appoint the Project Team Leaders for the duration of the contract. The Project Team Leaders shall be under the control of the PM. The Contractor shall inform the Contracting Authority of the areas of responsibility of all Project Team Leaders and their position within the overall project hierarchy.

4.1.4 The Contractor shall notify the Contracting Authority immediately of any changes in the Contractor's project management team.

4.1.5 **Deliverables:**

- a. Project Management Plan

4.2 Project Management Schedule (PMS)

4.2.1 A Project Management Schedule (PMS) showing the sequence of tasks, milestones and schedule of main events, is required. The PMS shall:

- a. include the sequence and completion dates of project tasks / sub-tasks, activities, project milestones, deliverable items and design reviews;
- b. data provided shall relate to the Contractor's internal work breakdown and scheduling systems and shall be presented in bar chart form with planned task durations commencing from contract award. The charts shall also be provided in network form, if required for clarity;
- c. when accepted by the TA, the Contractor's PMS shall be the governing document for scheduling activities and DND will plan personnel availability according to this schedule.
- d. the Contractor shall inform the Contracting Authority immediately when any slippage becomes apparent. The TA, through the Contracting Authority, shall approve the amended PMS prior to its implementation; and
- e. updated copies of the PMS shall be attached to the Monthly Progress Report as required.

4.2.2 **Deliverables:**

- a. Updated Project Management Schedule.

4.3 Monthly Progress Reports

4.3.1 Requirements

4.3.1.1 The Contractor shall submit monthly progress reports to the Contracting Authority with a copy to the TA until the final installation of all systems. The first report is due within five (5) working days of the end of the month in which the contract is awarded and within five (5) working days of the end of every month for the duration of the contract. The monthly progress reports shall list activities during the previous month, problem areas with work around plans, major accomplishments and activities planned for the next month. The monthly progress reports shall not be longer than two (2) letter-size pages.

4.3.2 Deliverables:

- a. Monthly Progress Reports.

4.4 Review Meetings

4.4.1 Contract Review Meetings (CRM) and Technical Review Meetings (TRM) shall be held. The Contracting Authority shall chair these meetings. The Contractor is to propose the frequency of these meetings, but they are not to be more than three (3) months apart. Where applicable the Contractor shall provide all facilities required and submit agendas to the Contracting Authority with a copy to the TA at least ten (10) working days prior to the meeting. The Contractor shall prepare minutes of the meetings with an Action Item List (AIL) and distribute them within five (5) working days of adjournment. The Action Item List shall be maintained by the Contractor. The AIL shall note action items and the agency responsible for their completion. The minutes and AIL shall be provided to the Contracting Authority and TA for approval. After approval and signature by the Contracting Authority, the Contractor shall issue one (1) copy to the TA and one (1) copy to each attendee. The purpose of the meetings shall be:

- a. Contract Review Meetings - CRMs shall be held at the Contractor's facility or Government facility as designated by the Contracting Authority to review overall technical and administrative contract activities; and
- b. Technical Review Meetings - TRMs shall be held at the Contractor's facility or Government facility as designated by the Contracting Authority to review technical activities. A TRM shall be held at the end of each phase of the work and may be combined with a CRM.

4.4.2 Deliverables:

- a. Agenda for contract review meeting;
- b. Contract Review Meetings;
- c. Minutes to the Contract Review Meetings;
- d. Agenda for technical review meeting;
- e. Technical Review Meetings; and
- f. Minutes to the Technical Review Meetings.

4.5 Quality Assurance

4.5.1 The Quality Assurance Program QAP shall be acceptable to the TA and shall ensure that the quality requirements are identified and satisfied throughout all phases of contract performance, including, as applicable, design, development, purchasing, manufacture, testing, inspection, preservation, packing, shipping, storage and installation. A quality assurance plan shall detail each stage of the contract where quality assurance inspections are to be carried out as well as the type of inspection involved. The QAP shall permit the prompt detection and correction of any deficiencies, trends and conditions. Evidence that the QAP is in effect and in accordance with the approved quality assurance plan shall be readily available to the TA within 30 days ACA. Updates to the QAP shall be submitted as required throughout the duration of the contract.

4.5.2 Deliverables:

- a. Updated Quality Plan.

5.0 DETAILED REQUIREMENTS

5.1 IF and FAC System Requirements

5.1.1 Appendix 1 (Functional Requirements) has been written to detail all the requirements for the IF and FAC Trainer. The format of the document details the requirements in terms of top-level functional requirements. Depending on the technical approach, hardware selection, and maturity of the contractors systems, certain functional requirements could be embedded in other system capabilities.

5.1.2 The contractor shall fabricate IF and FAC Trainers to meet the requirements of Appendix 1 (Functional Requirements) to this SOW.

5.1.3 Deliverables:

- a. Static IF and FAC Trainers , qty 5, and
- b. Portable IF and FAC Trainers, qty 3.

5.2 Delivery and Installation

5.2.1 The Contractor shall deliver and install the IF and FACT trainers in accordance with the requirements of Appendix 2 (Equipment Distribution) of this SOW.

5.2.2 Deliverables:

- a. Delivery to sites; and
- b. Installations at designated sites.

5.3 Publications

5.3.1 The contractor shall produce publications in accordance with the requirements of Appendix 3 (Technical Publications) to this SOW.

5.3.2 Deliverables:

- a. draft English manuscripts for review;
- b. bilingual reproducible copy for review after acceptance of the draft English manuscripts; and
- c. production bilingual publications consisting of:
 - (i). Data Summary (MA) CFTO Format;
 - (ii). Operators Manual; CFTO Format; and
 - (iii). Software User Manual; CFTO Format

5.4 Engineering Drawings

5.4.1 The Contractor shall produce Engineering Drawings in accordance with the requirements of Appendix 4 (Engineering Drawings and Associated Lists) of this SOW. Level 1/Level 2 drawings and associated lists shall be provided for the systems and all ancillary items. Existing drawings will be accepted for work already completed, subject to review and the requirements of Appendix 4. The drawings and associated lists shall be delivered with shipment of the production IF and FAC Trainer and shall reflect the "as built" configuration of the equipment.

5.4.2 If the contractor has placed a part number on any COTS item, a list must be included that defines the Original Equipment Manufacture (OEM), OEM part number, make, model and a source of supply for the item.

5.4.3 Deliverables:

- a. Engineering drawings and associated lists.

5.5 Acceptance Testing

5.5.1 The contractor shall develop acceptance test plans and perform system tests in accordance with the requirements of Appendix 5 (Acceptance Testing) of this SOW.

5.5.2 Deliverables:

- a. Draft First System Acceptance Test Plan (FSATP);
- b. Final First System Acceptance Test Plan (FSATP);
- c. Draft Site Acceptance Test Plan (SATP);
- d. Final Site Acceptance Test Plan (SATP);
- e. First System Acceptance Testing;
- f. First System Acceptance Test Report;
- g. Site Acceptance Testing; and
- h. Site Acceptance Test Reports.

5.6 Training

5.6.1 The Contractor shall develop bilingual course training packages (CTPs) for operators and conduct training courses in accordance with the requirements of Appendix 6 (Operator Training and Course Training Packages) of this SOW.

5.6.2 Deliverables:

- a. Draft Operator Course Training Packages;
- b. Final Operator Course Training Package; and
- c. Initial Cadre Training.

5.7 Contractor Conducted Logistic Support (CCLS)

5.7.1 Contractor shall prepare a detailed CCLS plan to meet the requirements of Appendix 7 (Contractor Conducted Logistic support). CCLS services shall be for five years. Contractor shall provide CCLS services for 5 years based on Appendix 7. CCLS will start after warranty period of 1 year. The contractor shall provide Technical Investigation and Engineering Studies (TIES) services as detailed in Appendix 7.

5.7.2 Deliverables:

- a. 5 years CCLS support;
- b. Contractor-held LRU report. (Work Element 1)
- c. Quarterly Report, (Work Element 1)
- d. Access to Data Base, (Work Element 1)
- e. Minutes of Meetings. (Work Element 1)
- f. AWR Work (Work Element 2)
- g. AWR Investigation Reports (Work Element 2)
- h. FSR Work for AWR support (Work Element 3)
- i. FSR Report (Work Element 3)
- j. Course Training Plan (Work Element 4)
- k. IF & FAC Course (Work Element 4)
- l. TIES Services (Work Element 5) ; and
- m. Spare Parts and LRUs (Work Element 6)

5.8 Initial Spare Line Replaceable Units (LRUs)

5.8.1 The contractor shall prepare a list of recommended spare Line Replaceable Units (LRUs) to meet the 72-hour repair Turn Around Time (TAT) within 30 days ACA. The recommended LRUs shall support the maintenance concept of operator maintenance by LRU replacement. The list shall include a description of the item, manufacturer, manufacturer's part number, recommended quantity for purchase, unit cost, total item cost and reasons for the purchase of the item and quantity. The reasons for the purchase shall be supported with data such as reliability data (ie Mean Time Between Failure), reparability data, availability data, etc. The DND TA shall be the approval authority for the purchase of the recommended LRUs. The contractor shall provide LRUs as defined by the Contracting Authority in the contract.

5.8.2 Deliverables:

- a. Contractors recommended LRU listing with quantities; and
- b. LRUs.

Appendix 1
To: ANNEX A
To: W8486-100463
DATED: 17 December 2009

FUNCTIONAL REQUIREMENTS

INDIRECT FIRE AND FORWARD AIR CONTROLLER

(IF and FAC)TRAINER

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1.0 **INTRODUCTION**

1.1 **Aim**

1.1.1 This specification states the minimum technical, functional and operational requirements for an IF and FAC Trainer to be used by all soldiers trained in the control of indirect ground artillery and air delivered fire and effects.

1.2 **Performance Criteria**

1.2.1 In this Statement of Work a mandatory requirement is a criterion that shall be met. The word "shall" and "must" are synonymous with mandatory. Desirable or optional requirements are indicated by "should".

1.3 **References**

- a. Canadian Artillery Doctrine <http://armyapp.dnd.ca/ael> ;
- b. B-GL-371-004/FP-001; Field Artillery, Duties at Regimental Headquarters and the Gun Position ;
- c. Joint Publication 3-09.3 (USA) Close Air Support
- d. IEEE1516-2000 Standard for Modelling and Simulation (M&S) High Level Architecture; and
- e. Department of Communications (DOC) or Federal Communications Commission (FCC) specifications for electronic equipment as applicable.

2.0 **REQUIREMENTS**

2.1 **General**

- 2.1.1 The IF and FAC Trainer's primary task shall be to simulate realistic scenarios ranging from war fighting to peace support operations. It shall simulate terrain, weather, targets and ordnance delivery systems that shall range from indirect fire weapon systems to aircraft.
- 2.1.2 The language for the operation of the IF and FAC Trainer shall be selectable by the operator on system start up. The available languages shall be English and French.
- 2.1.3 Only personnel trained in the use of the IF and FAC Trainer will operate the trainer. A wide range of users will act as students with the IF and FAC Trainer across most trades in the CF. However, soldiers whose job is the control of indirect fire and aircraft will be the primary training audience.
- 2.1.4 The IF and FAC Trainer shall provide students/trainees a detailed and accurate simulated environment in order to provide them the valuable training to practice IF and Close Air Support. The environment shall provide students the ability to control indirect fire and control aircraft as well as view the effects of their direction in real time.
- 2.1.5 The static IF and FAC Trainer will be used primarily in permanent facilities specifically designed to house the system.

- 2.1.6 The IF and FAC Trainer will be positioned with all Regular Force Artillery units and the Artillery School. In addition to the trainers being deployed with the regular force and Field Artillery School, there is a requirement for two portable systems to be positioned at the Artillery School (that can be deployed with FAC courses training outside of the School) and one portable system to deploy with the **Canadian Maneuver Training Center (CMTC)** and as a standalone for overseas operations.
- 2.1.7 **The primary purpose of the IF and FAC Trainer shall be to train Artillery Forward Observation Officers (FOOs) and Artillery Forward Observation Technicians to call for and correct ground based artillery indirect fire. The secondary purpose of the IF and FAC Trainer shall be to train Forward Air Control Officers and Forward Air control Technicians to call for and direct aircraft delivered munitions.**
- 2.1.8 Each trainer shall normally train a team consisting of up to two (2) people for indirect fire training, and two (2) people for close air support training.
- 2.1.9 Each IF and FAC Trainer shall consist of the following basic components:
- a. Operator Control Station consisting of;
 - (i) a man to machine interface (i.e. keyboard, mouse, flat screen monitor(s), storage device(s), etc.);
 - (ii) applicable hardware; and
 - (iii) applicable software.
 - b. Pilot Control Station consisting of;
 - (i) man to machine interface (i.e. keyboard, mouse, joystick, flat screen monitor(s), storage device(s), etc.);
 - (ii) applicable hardware; and
 - (iii) applicable software.
 - c. Trainee Control Station consisting of:
 - a. FOO/FAC components Include:
 - (i) a man to machine interface (i.e. keyboard, mouse, flat screen monitor, storage device, etc.) per station; and
 - (ii) virtual display that can be worn with a communication system.
 - b. FO/FAC Technician components consist of:
 - (i) a man to machine interface (i.e. keyboard, mouse, flat screen monitor(s), storage device, etc.) per station;
 - (ii) wide screen FOV of the terrain and targets;
 - (iii) Selectable virtual binocular display with reticule;
 - (iv) two pairs of optical binoculars collimated for use with the screen;
 - (v) selectable virtual laser target marker with reticule and controls;
 - (vi) selectable virtual laser target range finder with reticule and controls;
 - (vii) should have a mock up laser ranger finder, such as the in service model (DESIRABLE CAPABILITY);

- (viii) should have a mock up laser target marker or laser target designator (DESIRABLE CAPABILITY);
 - (ix) integrated maps;
 - (x) applicable computer hardware and cabling to peripherals; and
 - (xi) computer software.
- d. System components consisting of:
- (i) static system shall have projectors and screens,
 - (ii) portable system should have projectors and screens (DESIRABLE CAPABILITY);
 - (iii) static system shall have an sound system;
 - (iv) Portable system should have an sound system (DESIRABLE CAPABILITY) ;
 - (v) training scenarios (based on government specified missions);
 - (vi) targets to include mobile dismounted troops, mobile vehicle both armoured and soft skin, stationary targets, infrastructure, etc.;
 - (vii) terrain and weapon effects image generation system integrated with MGRS based maps, that shall cover 30 X 30 kilometres;
 - (viii) miscellaneous cabling hardware to connect stations and projectors as required;
 - (ix) computer hardware that is not part of control, pilot or trainee stations;
 - (x) should have a printer for the static system (DESIRABLE CAPABILITY); and
 - (xi) two (2) pairs of optical binoculars collimated for screen use by a second observation team waiting training.

2.2 **FAC Training Capability**

- 2.2.1 The system shall be capable of performing, as a minimum, training in accordance with Type 1, DAY, Talk On, CAS standards.

3.0 **MANDATORY REQUIREMENTS**

3.1 **Physical Characteristics**

- 3.1.1 The IF and FAC Trainer shall be user-friendly with pull down intuitive menus and capable of being operated by Forward Observation Officers (FOO) and FAC-qualified personnel.
- 3.1.2 System start-up and shutdown shall be completed by the operator in less than 15 minutes.
- 3.1.3 The contractor is responsible to obtain all the data and characteristics pertaining to the simulated aircraft, guns and munitions mentioned in this document.

- 3.1.4 The IF and FAC Trainer is intended and shall be designed for use in normal classroom conditions. The system shall withstand all conditions within the specified limits as set out below:
- a. Dimensions - the system shall be used indoors in standard training facilities. The static system shall operate in a space of 14 meters by 8 meters with a maximum ceiling height of 3 meters;
 - b. Operating Temperature - the trainer shall operate in a temperature environment of +5 degrees C to +35 degrees C;
 - c. Relative Humidity - the trainer shall be capable of operation and storage in non-condensing humidity between 20 and 85 percent;
 - d. Storage Temperature - the trainer shall operate within five (5) hours after having been removed from storage in a temperature environment of -15 degrees C to +35 degrees C; and
 - e. Power Requirements - voltage requirements shall be the standard North American 110 volts, 60 Hertz, single phase. Voltage requirements shall be switchable to 220 volts, 50 Hertz, single phase. The system shall be protected against normal commercial power fluctuations (surges and spikes). The loss of power shall not cause corruption of the computer's simulation programs or operating system.
- 3.1.5 The portable configuration shall be set-up in an austere classroom and must meet the requirement as defined in 3.1.4., except that should a projector be required the ceiling height must be no more than 2 meters or capable of projecting main image onto a large screen T.V.

3.2 Simulation of Surface-based Weapons Platforms

- 3.2.1 The IF and FAC Trainer shall simulate fire from a minimum of 10 Batteries with 8 guns /mortars each (80 guns total) that can be equipped with any of the following ground-based tube weapon platforms:
- a. 81mm mortar;
 - b. 105mm howitzer; and
 - c. 155mm howitzer.
- 3.2.2 The IF and FAC Trainer shall simulate fire from up to three rocket launchers, firing single and multiple rocket launches per mission. Examples of rocket platforms are the Multiple Launch Rocket Systems (MLRS) and High Mobility Artillery Rocket System (HIMARS).
- 3.2.3 The IF and FAC Trainer should simulate fire of the following calibers from sea-based platforms:
- a. 4.5 inch; and
 - b. 76mm.

3.3 Simulation of Air-based Weapon Platforms

- 3.3.1 The IF and FAC Trainer fixed and rotary wings aircrafts shall simulate realistic attack speeds, altitudes and exterior aircraft characteristics.
- 3.3.2 The IF and FAC Trainer shall simulate fire from fixed wing ground attack aircraft.

- 3.3.3 The Pilot Station for the fixed wing aircraft simulation shall have the following functionalities:
- selection of initial point (IP) to the target area and then to the selected egress point;
 - selection of attack run altitude from three different altitude: low, medium and high altitude, consistent with current practices;
 - abort the mission at any time; and
 - enter guided munitions (i.e. Joint Direct Attack Munitions) coordinates in Military Grid Reference System (MGRS) and Universal Transverse Mercator (UTM).
- 3.3.4 The IF and FAC Trainer shall simulate at least the following fixed-wing aircraft:
- A10;
 - F15;
 - F16;
 - F18;
 - AV8B Harrier;
 - B52; and
 - B1B.
- 3.3.5 The IF and FAC Trainer shall simulate fire from a maximum of four rotary wing close air support aircraft simultaneously. The pilot station for the rotary wing aircraft simulation shall have the following functionalities:
- select the size of Battle Positions (BP) from which aircraft will conduct pop up and down tactical attacks; and
 - conduct running, low level contour of the earth flight attacks on headings in degrees magnetic, grid or true from the BP centre point.
- 3.3.6 The IF and FAC Trainer shall simulate at least the following rotary wing aircraft:
- AH-1 Cobra;
 - AH-64 Apache;
 - OH-58D Kiowa;
 - UH1D Huey; and
 - MHL-60DAP Black Hawk.
- 3.3.7 The IF and FAC Trainer shall simulate fire from AC130 Gunship close air support aircraft. The pilot station for the AC130 Gunship simulation shall have the following functionalities:
- selection of attack run altitudes in increments of 500 feet Above Ground Level (AGL) between 1,000 feet and 8,000 feet;
 - have computer control mission flights;
 - abort the mission at any time; and
 - change and adjust the aim point and target using cardinal directions and number of meters to new target and new coordinates.

- 3.3.8 The IF and FAC Trainer should permit the operator to input an attack profile for a fixed or rotary wing aircraft, and the system should be able to fly this on auto pilot, with pause and restart capability.

3.4 **Simulation of Ammunition**

- 3.4.1 In the case of all ammunition, the IF and FAC Trainer shall accurately simulate the effects of the ammunition including:
- a. trajectory;
 - b. time of flight; and
 - c. terminal effects including;
 - (i) splinter patterns (primarily for airburst ammunition ground effects);
 - (ii) burst radius;
 - (iii) maximum physical dimensions of the explosion;
 - (iv) time to build for smoke;
 - (v) time to dissipate for smoke and battlefield obscurants like dust;
 - (vi) illumination build up, drift with weather and burnout;
 - (vii) cratering;
 - (viii) kill effects based on target type; and
 - (ix) effects of impact on varying ground types varying from hard packed to water.
- 3.4.2 Laser Guided Bombs shall be accurately simulated.
- 3.4.3 The IF and FAC Trainer shall simulate, as a minimum, the following ammunition delivered by ground-based tube artillery systems defined in Para 3.2.1:
- a. High Explosive (HE) Point detonating;
 - b. HE delay detonation;
 - c. HE airburst (proximity and mechanical time);
 - d. Smoke Base Ejection (white, and colored);
 - e. Illumination (visual); and
 - f. Excalibur Global Positioning System (GPS) guided, or variable parameters to act in a similar way to Excalibur. **Note:** The system doesn't have to have an Excalibur round, as long as the functionality of off sets for accuracy can be set to reflect the true performance and the terminal effects are similar for standard HE in PD, Delay or Airburst.
- 3.4.4 The IF and FAC Trainer shall simulate, as a minimum, the following ammunition delivered by sea-based gun systems defined in Para 3.2.3:
- a. High Explosive (HE) point detonating;
 - b. HE delay detonation;
 - c. HE airburst (proximity and mechanical time);
 - d. Illumination; and
 - e. Starshell.

- 3.4.5 The IF and FAC Trainer shall simulate, as a minimum, the following armaments for fixed-wing aircraft as defined in para 3.3.4:
- a. 20mm cannon;
 - b. 30mm cannon;
 - c. a variety of 500 lb and 1000 lb general purpose bomb (high and low drag, GPS guided, laser guided, etc);
 - d. 2.75" rockets; and
 - e. AGM-65 Maverick.
- 3.4.6 The IF and FAC Trainer shall simulate, as a minimum, the following armaments for rotary-wing aircraft as defined in para 3.3.6:
- a. 7.62 mm cannon;
 - b. 20 mm cannon;
 - c. 30 mm cannon;
 - d. .50 calibre cannon;
 - e. GAU-16 and GAU-17;
 - f. Hellfire with or without ground designation; and
 - g. 2.75" rockets.
- 3.4.7 The IF and FAC Trainer shall simulate, as a minimum, the following armaments for AC130 Gunship as defined in para 3.3.7:
- a. 105 mm HE point detonating;
 - b. 105 mm HE delay detonation;
 - c. 105 mm HE proximity detonation;
 - d. 40 mm cannon;
 - e. 25 mm cannon; and
 - f. parachute flares.

3.5 **Fire Planning**

- 3.5.1 All virtual fire support assets shall be integrated with a computer-controlled schedule fire plan. It is desirable the fire plan to be based on Canadian Artillery doctrine.
- 3.5.2 The fire plan data shall be directly enterable by the operator based on the ten line target message.
- 3.5.3 The IF and FAC Trainer shall be upgradeable by the contractor to reflect any changes in the CF's indirect fire systems, target acquisitions systems, doctrine for the conduct of indirect fire missions and future ammunition types that might be purchased by Canada.
- 3.5.4 The IF and FAC Trainer shall store up to nine target lists of 20 targets each at any time. The system shall use/accept alphanumeric designators for target records, e.g. ZT2150. IF and FAC Trainer operator shall input target lists into system memory using keyboard or memory devices, e.g. via the use of CDs or memory stick.

- 3.5.5 The IF and FAC Trainer shall maintain a count of the number and type of rounds fired during each fire mission. A running total of rounds fired, by type, shall also be maintained from system start up to shut down. Round totals shall be displayed to the operator at the end of each mission and the running total shall be presented upon exiting the training program. The operator shall have the option to input at his/her own discretion, the type and number of rounds of allotted ammunition available for a fire mission and fire plan. The IF and FAC Trainer shall generate a warning to the operator when the allotted number of rounds has been exceeded. In addition to the realistic representation of bursts, for initial observer training the IF and FAC Trainer operator shall have the option to override and vary both burst size and duration. The system shall fire across the 00 Easting and Northing lines with no errors or system failures.
- 3.5.6 The IF and FAC Trainer shall have fire plans that are adjustable from one observation post location and can be fired and observed from another observation post location.
- 3.5.7 The IF and FAC Trainer shall have a permanent, adjustable clock (digital, 24 hour, displaying hours, minutes and seconds) on the operator and student screens.
- 3.5.8 The IF and FAC Trainer shall fire the fire plan automatically once the operator has inputted the fire plan into the system.
- 3.5.9 The system shall subtract the proper time of flight from the required time of impact/fuse function and fire the fire plan serials accordingly.
- 3.5.10 The system shall permit the operator to amend and change the following before and during the execution of the fire plan:
 - a. H-Hour,
 - b. duration of the engagement of a particular target,
 - c. location of fire,
 - d. the weight of fire placed on any target,
 - e. the start and stop time for the engagement of any target,
 - f. make corrections and adjustments to targets;
 - g. add new targets;
 - h. stop and start the fire plan;
 - i. add and subtract minutes from timed serials;
 - j. continue to fire on individual targets and target groups; and
 - k. create additional timings for two or more fire plans.

3.6 **Entities and Targets**

- 3.6.1 The system shall manage and display a minimum of 200 operator entered entities without causing any system degradation in performance.
- 3.6.2 The IF and FAC Trainer shall have as a minimum the following realistic computer generated entities:
 - a. troops;
 - b. infrastructure (ie. Buildings, roads, utilities, etc); and
 - c. soft skinned, and armoured vehicles.

3.6.3 In addition to their normal states all entities shall have damaged and destroyed states.

3.7 **Target Adjustment/Engagement**

3.7.1 The firing performance of in-service howitzers and mortars with respect to zone, time of flight and maximum range shall be simulated. The operator shall set time of flight as real or an arbitrary time. If set to real, time of flight shall be reported to the operator before each round (or group of rounds in fire for effect) is fired. Both low and high angle fire shall be simulated and the IF and FAC Trainer observer shall modify the height of burst of air burst ammunition as required. The following points pertain to target adjustment/engagement:

- a. Input data shall be corrected by the operator without having to re-enter all data. Where appropriate, data input shall follow the sequence of orders required for the observer call for fire. The IF and FAC Trainer operator shall perform adjustment and engagement of targets using the following methods;
 - (i) target grid procedure input by the operator of target grid coordinates as a 6, 8 and 10 figure grid reference. Elevation data shall be input by the operator based on observer input;
 - (ii) adjustment using polar coordinates;
 - (iii) adjustment from a previously recorded target and known point;
 - (iv) laser adjustment; and
 - (v) firing of a previously recorded target,
- b. When a target is identified by polar coordinates with respect to the observers position the target grid reference shall be calculated and displayed on the operator's screen and when the target is identified by grid reference the target polar coordinates with respect to the observer position shall be calculated and displayed on the operator screen; and
- c. When a target is called up by its recorded target number the system shall automatically display on the operators screen the appropriate grid and polar coordinates from the observer position.

3.7.2 The IF and FAC Trainer shall:

- a. simulate the simultaneous fire of up to 10 fire units. A fire unit is defined as any field artillery battery, field artillery section, mortar platoon or mortar group firing as an independent unit. Each fire unit shall each be able to have up to eight (8) mortars or howitzers firing in any number from one (1) to eight (8). It should be noted that the terms "battery" and "fire unit" are used interchangeably as applicable to the context of the sentence. Each battery center shall be defined by a ten (10)-figure grid reference and an altitude (up to +5000m and -400m in one meter increments with respect to sea level). Batteries shall be capable of being located at any point around the periphery of the target area independent of the observer's location in relation to the impact area, within the range limits of the selected weapon type and ammunition. Each gun within each battery shall be located relative to the battery center by specifying a 4-figure bearing in mils with respect to grid north and a three (3)-figure range in meters;
- b. have the above simultaneous fire be with any combination of ammunition and varying rates of fire;
- c. conduct individual corrections for fire units during fire plans and regimental fire missions;

- d. be controlled by the operator, conduct simultaneous adjusting fire from one or more guns/mortars not necessarily from the same fire unit and not necessarily using the same ammunition;
- e. select firing of battery right and left with either the standard (5 seconds) or any selected interval;
- f. be controlled by the operator; start, stop and re-start fire from any selected fire unit (when the operator stops the fire of any unit(s), rounds already fired and "in the air" shall continue to the terrain scene);
- g. report the value of one probable error in range to the operator before a round is fired;
- h. be controlled by the operator, cause the system to simulate ammunition malfunctions by setting individual adjusting rounds of illuminating, mechanical time fused and proximity fused ammunition to impact rather than function at the proper height of burst;
- i. be controlled by the operator, cause the system to simulate malfunction of the parachute on individual illuminating rounds such that the round provides only half the normal illumination and descends at four times the normal velocity;
- j. have varying rates of fire of up to eight rounds per minute for 105mm and 155mm artillery, and 30 rounds per minute for 81mm mortars. The rate of fire for smoke and WP rounds shall be variable, for example, with a rate of three rounds immediate followed by six rounds fire for effect 30 seconds. (Once started, the gun will fire 4 rounds as fast as it can and then wait 30 seconds, fire a round, wait 30 seconds, etc until 5 rounds are fired). The initial method shall be put into the fire control orders but the operator shall be able to adjust the rounds once the fire mission has actually started and not wait for the entire fire mission to finish before adjusting. Both the immediate and follow-on rounds shall be adjustable;
- k. have all the currently used distributions of fire and a variable separation distance between the points of impact between zero and 500 meters. The distributions required include:
 - (i) converge;
 - (ii) linear including firing linear along any direction;
 - (iii) deliberate smoke including firing the mission along any direction;
 - (iv) circular radius;
 - (v) parallel; and
 - (vi) standard scatterable anti-tank minefield modules.
- l. have all the distributions of fire used with illumination ammunition. The distributions required include:
 - (i) single round;
 - (ii) lateral spread;
 - (iii) range spread; and
 - (iv) diamond illumination.

3.8 **Viewing, Surveillance, Target Acquisition and Night Observation Capabilities**

3.8.1 **Naked Eye View**

3.8.1.1 The IF and FAC Trainer minimal field of view shall be 90 degrees horizontally by 30 degrees vertical. The trainer shall provide as a minimum a color realistic, high-resolution image display (2400x1024 pixels at 3,500 ANSI lumens) of terrain, targets and weapons effects and shall simulate typical situations encountered by FOO and FAC parties in the field. All images shall be displayed with the same resolution (i.e. targets shall be presented in the same resolution as the background).

3.8.1.2 The portable IF and FAC Trainer shall have a minimum field of view of 25 degrees horizontal by 20 degrees vertical with a resolution of 1024 x 768 pixels.

3.8.1.3 Target and terrain views on the IF and FAC Trainer shall provide accurate depth perception and correct scaling.

3.8.2 **Optical Binocular View (Static System Only)**

3.8.2.1 The static system shall have optical binoculars similar to the in-service M22 binoculars. The binoculars shall have a field of view of 8 degrees and have seven times magnification. The system shall have four sets of binoculars. Two sets shall be collimated for viewing at the FOO/FAC technician position. The additional two sets of binoculars shall be collimated for viewing at a distance behind the FOO/FAC position (to be specified after contract award). The binoculars shall:

- a. have the Canadian reticule patterns calibrated for the appropriate viewing distance;
- b. be collimated to measure the correct "real world" angles on the projected terrain scenes when used at the correct distance from the screen (± 5 percent); and
- c. be used without restriction for personnel who wear glasses and environmental clothing such as a gas mask.

3.8.3 **Virtual Binoculars**

3.8.3.1 The FOO/FAC technician shall have a capability to select a virtual binocular view of an area of interest selected by the technician. The field of view shall be 8 degrees and represent a times seven magnification of the area of interest. The virtual binocular view shall have the Canadian binocular reticle pattern properly scaled. The technician shall be able to move the area of interest through the use of an appropriate input device (ie joystick).

3.8.4 **Compass View**

3.8.4.1 The operator shall be capable of displaying a virtual compass display on the naked eye view in mils and degrees selectable by the operator. The compass display shall provide orientation of the FOO/FAC position to the centre of the large scene view.

3.8.5 **Virtual Laser Rangefinder**

3.8.5.1 The FOO/FAC technician shall have a capability to select a virtual laser rangefinder view of an area of interest selected by the technician. The virtual laser rangefinder shall indicate multiple returns if so required for a specific area. The field of view shall be a minimum of 8 degrees and represent a times seven magnification of the area of interest. The virtual laser rangefinder view shall have a reticule pattern properly scaled with an aiming mark. The technician shall be able to move the field of view

(panorama) through the use of an appropriate input device (ie joystick) and activate the device. The virtual laser rangefinder shall display direction in mils from grid north for the observer/target direction, vertical angle between the observer and target, distance in metres to the target, and a ten figure grid reference of the target (Military Grid Reference System (MGRS) or Universal Transverse Mercator (UTM))

3.8.5.2 It is desirable for the static system to include a physical mock-up version of a laser rangefinder with the capabilities described above. The FOO/FAC technician would physically use the mock-up like an actual Laser rangefinder.

3.8.6 Virtual Laser Target Designator

3.8.6.1 The FOO/FAC technician shall have a capability to select a virtual laser target designator view of an area of interest selected by the technician and lazed. The field of view shall be a minimum of 88.89 mils (5°) Horizontal, 78.22 mils (4.4°) Vertical and represent a times 10 magnification of the area of interest. The virtual laser target designator view shall have a reticule pattern properly scaled with an aiming mark. The technician shall be able to move the aiming mark (panorama) through the use of an appropriate input device (ie joystick) and activate the device. The virtual laser rangefinder shall display direction in mils from grid north for the observer/target direction, vertical angle between the observer and target, distance in metres to the target, and a ten figure grid reference of the target (MGRS or UTM). The virtual laser target designator shall provide visual confirmation of the laser designator spot to the FAC Technician

3.8.6.2 It is desirable for the static system to include a physical mock-up version of a laser target designator with the capabilities described above. The FOO/FAC technician would physically use the mock-up like an actual laser target designator.

3.8.7 Virtual 360° Position View

3.8.7.1 The FOO/FAC officer shall have a 360° view in azimuth and a -30 to +80° view in elevation of the world from the FOO/FAC position through the use of a head mounted display (HMD) or similar device. The instantaneous field of view presented to the FOO/FAC officers shall be a minimum of 45 degrees by 35 degrees with a minimum resolution of 1280 by 1024 pixels. The instantaneous field of view shall be based on the movements of the FOO/FAC officer's head. The HMD view shall permit the FOO/FAC officer to visually acquire ground targets and inbound aircraft and direct the aircraft on to the target. The FOO/FAC officer shall have a control to permit the HMD view to change to a virtual binocular view with an 8 degree field of view.

3.8.8 Training with Night Vision Goggles

3.8.8.1 It is desirable for the system to include the capability to permit training for the FOO/FAC officer and technician using the in-service Generation III Night Vision Goggles. The view should be caused by a filter on the projector or onscreen image that is viewable only with NVG, and if system uses an Head Mounted Display (HMD) it should have a separate graphics display for the HMD that will display an IR view without aid of NVGs.

3.8.9 Thermal Imager Simulation

3.8.9.1 It is desirable for the system to include a virtual thermal imager feature to permit training for the FOO/FAC officer and technician. The view should closely reflect the view the soldier would expect to see in real life. The minimum is to have the main screen and HMD image change to a thermal view, but it is desirable that this thermal image be the result of the trainee selecting a thermal instrument and see a thermal view through the virtual eyepiece. Should the system use the virtual instrument approach, the field of view should be a minimum of 88.89 mils (5°) Horizontal, 66.67 mils (3.75°) Vertical and represent a times 4 magnification of the area of interest on wide view, and should as a

minimum have a view of 26.67 mils (1.5°) Horizontal, 19.91 mils (1.12°) Vertical and represent a times 13 magnification of the area of interest on narrow view.

3.9 **Target and Observer Indicating Capabilities**

- 3.9.1 The IF and FAC Trainer shall mimic simulated colored smoke, visual strobe and marking panels (VS 17) for the FAC to indicate his/her position. The system shall have a capability to activate these features.
- 3.9.2 The IF and FAC Trainer should use a virtual infrared (IR) pointer to indicate the target position to the pilot station indicating the rope, snake, pulse and sparkle functions. The IR pointer should be capable of being turned on or off by the student.

3.10 **Simulated Terrain**

- 3.10.1 The IF and FAC Trainer shall be delivered with seven (7) different terrains and associated maps to include one each of the following terrain types:
 - a. one Urban area;
 - b. one Forest area;
 - c. one Mountain area;
 - d. one Desert area; and
 - e. three (3) mixed terrain areas (includes fields, woods, houses, hills, etc).
- 3.10.2 The IF and FAC Trainer should provide terrain simulation for the following Canadian Training Areas:
 - a. CTC Gagetown;
 - b. CFB Petawawa;
 - c. CFB Shilo;
 - d. CFB Suffield;
 - e. BFC Valcartier; and
 - f. Camp Wainwright.

NOTE:

DND will provide DTED Level II data for any new Canadian areas to be created.

- 3.10.3 Map areas shall be as a minimum 30 kilometers by 30 kilometers for the simulated aircraft to conduct maneuvers indicated in section 3.3. It is desirable that this terrain be 50 kilometers by 50 kilometers

3.11 **Simulated Weather and Battlefield Conditions**

- 3.11.1 All weather and battlefield conditions shall be programmable and modifiable by the operator while the simulation is running.
- 3.11.2 The IF and FAC Trainer shall adopt corrections of the moment that result from registration and laser registration fire missions. The system shall upgrade survey and meteorological conditions/corrections of the moment as required. The operator shall introduce grid and elevation offset errors into the system to simulate errors contained in location survey, unusual atmospheric conditions and poor ammunition.

3.11.3 The IF and FAC Trainer shall simulate all weather conditions to include a minimum of:

- a. rain;
- b. sleet;
- c. fog;
- d. blowing sand;
- e. sunny and clear; and
- f. snow.

3.11.4 The IF and FAC Trainer shall simulate varying levels of cloud cover from partially to fully covered.

3.11.5 The IF and FAC Trainer shall simulate varying wind strengths (0 to 60 km/h) and directions.

Note

Wind speed and direction shall affect smoke development and drift, illuminating rounds and high explosive rounds.

3.11.6 The IF and FAC Trainer shall simulate varying light conditions by sun and moon illumination.

3.11.7 The IF and FAC Trainer shall simulate battlefield obscurants such as smoke, dust and dirt from explosions that could obscure targets and affect laser operation.

3.11.8 Weather conditions shall affect all visual image intensified and thermal views if implemented. The effect should replicate actual real life degradation.

3.12 Observer Platforms

3.12.1 The IF and FAC Trainer shall permit the FOO/FAC party to be deployed in ground and airborne observer platforms.

3.12.2 The IF and FAC Trainer FAC shall permit student movement within the terrain and viewing direction using a joystick, keyboard or mouse.

3.12.3 The Static IF and FAC Trainer should have split screen, inset image or separate student monitor functionality to permit display of the pilot view, or display of other images (e.g. sniper pod view or simulated real-time video receiver display). The objective is to maintain main screen field of view as large as possible.

3.13 Scenario Creation

3.13.1 The IF and FAC Trainer shall permit the operator to create, modify, save, export and import training scenarios containing a minimum of 200 entities. The system shall permit the operator to print portions of 1:50 000 scale terrain maps including grid lines.

3.14 Hardware and Software

3.14.1 The Static IF and FAC Trainer shall incorporate a flat, wall sized screen to provide the FOO/FAC party with an immersive terrain environment.

3.14.2 The Static IF and FAC Trainer screen shall be a maximum of 8.5 feet high by 21 feet wide maximum in order to fit within current infrastructure. The minimum viewing area shall be 7.5 feet high by 20 feet wide.

- 3.14.3 IF and FAC Trainer shall be of modular construction in both hardware and software to permit the incorporation of new and updated technologies into the system. The system shall be upgradeable to new versions of both hardware and software in the same product line. Areas for enhancement with new technologies include:
- a. visual system replacement with enhanced graphics systems and computer generated imagery,
 - b. display devices for the training scenarios, and
 - c. system computer hardware (processing units, random access memory, disk storage devices).

3.15 **The Operator Station Functionality**

- 3.15.1 The operator's station shall be the main system workstation. The operator shall enter and execute a call for fire within sixty (60) seconds.
- 3.15.2 Each static IF and FAC Trainer should record and display to the operator stations individual student records. Each IF and FAC Trainer should, as a minimum, handle up to 500 student records, with each student having 10 practices recorded at one time. Each record should include at least the following;
- a. name;
 - b. rank;
 - c. service number;
 - d. unit;
 - e. sub-unit;
 - f. date;
 - g. title of practice;
 - h. target grid;
 - i. opening grid;
 - j. subsequent corrections;
 - k. ammunition fired;
 - l. any offset values entered by the instructor; and
 - m. a section for instructor comments with enough capacity to record, the equivalent of one half of a standard 8.5 x 11 inch page.
- 3.15.3 A report shall be recorded to a storage device, with the information being accessed, read, manipulated and printed by other IF and FAC Trainer.
- 3.15.4 Entry of mission data by the operator shall be no more than a single keystroke or mouse click to access the required data field when in the appropriate mission screen page of the operator station system.
- 3.15.5 The operator shall, when required, be capable of freezing the display of the impact of any round and replay the last fired mission at any time.

3.16 **User-friendliness**

- 3.16.1 The system shall be user-friendly such that, as a minimum, it shall have an intuitive operator interface and context sensitive help that describes what type of input is expected for the current data field.

3.17 Built-in-Test (BIT) Function

- 3.17.1 Each IF and FAC Trainer operator station shall have a BIT function. The BIT function shall, as a minimum, identify faults, down to the lowest assembly that the operator shall be responsible to change.

3.18 Pilot Station Functionality

- 3.18.1 The Pilot Station shall fly Close Air Support (CAS) missions and attack ground targets with all aircraft indicated in section 3.3 from a control station separate from the control station of the entire IF and FAC Trainer.
- 3.18.2 The Pilot Station shall have a display separate from the display required for the FOO/FAC student.
- 3.18.3 The aircraft shall depict realistic flight characteristics but shall be simple enough for a non-pilot qualified operator to control the aircraft.
- 3.18.4 The Pilot Stations operator shall view the ground from the cockpit via a window view to the left, right, up, down and over the tail of the aircraft.
- 3.18.5 The Pilot Station view from the cockpit should change with a seamless transition using the mouse or other pointing device.
- 3.18.6 The Pilot Stations operator shall be capable of flying the aircraft from a behind-the-aircraft view to have visibility of both the aircraft and the surrounding airspace/terrain.
- 3.18.7 The Pilot Station shall have a Heads Up Display (HUD) projected on the cockpit screen for the operator to:
- a. engage ground targets;
 - b. view aircraft altitude;
 - c. view the artificial horizon;
 - d. view aircraft airspeed; and
 - e. view aircraft bearing.
- 3.18.8 The Pilot Station shall have control of all the ammunition and equipment specified in section 3.0.
- 3.18.9 The Pilot Station trail aircraft shall follow the same flight profile as the operator-controlled aircraft with a time gap of 10 seconds to one minute.
- 3.18.10 The Pilot Station operator shall have the option of switching control to the trail aircraft for the primary aircraft to continue on its previous heading or designated orbit.
- 3.18.11 The operator should have the option of flying the attack mission on a preprogrammed flight pattern with no requirement for a pilot. The programmed flight plan should include:
- a. Target (preset location);
 - b. General attack profile;
 - c. Ammunition;
 - d. Speed;
 - e. Attack heading;
 - f. Altitude; and
 - g. hotkeys for, attack to execute setting and abort to return to wheel.

3.18.12 The Pilot Station shall have the functionality of a targeting pod with the following capabilities:

- a. Selectable with normal and zoomed view;
- b. slew and lock on to a student determined target coordinate in MGRS and UTM; and
- c. display a north indicator.

3.19 **Audio System (Static Version Only)**

- 3.19.1 There shall be realistic audio effects simulating the impact and functioning of each round (all ammunition types), which would normally be apparent to the observer. These effects shall vary appropriately as the point of impact and function moves closer to and further away from the observation post. The sound of overhead projectiles shall be simulated.
- 3.19.2 The audio effect shall be noticeably decreased yet still audible in the case of a round impacting in dead ground.
- 3.19.3 The audio system shall have the audio signature of impacting rounds, and realistic sound effects to aid in simulating a battlefield environment. These sound effects (synchronized to activities occurring in the visual display) shall include:
 - a. vehicle engine noises;
 - b. explosions;
 - c. machine gun/small arms fire; and
 - d. tank main armament fire and impact.
- 3.19.4 The operator shall select individual battlefield effects and any combination of effects, and shall activate and deactivate the selected effects at any time during the conduct of a fire mission.
- 3.19.5 Both the operator and pilot stations shall have a volume control to adjust the volume level between silence and sufficient volume to be heard over 10 people talking at normal volume. Sound effects shall be heard from separate speakers, not on the communications system.

3.20 **Communication (Static Version Only Option)**

- 3.20.1 The communication system shall be used to simulate the radios and nets available for the passage of orders. Each communication system station shall have one headset, one microphone and one loudspeaker. The loudspeaker shall be capable of being switched on and off and shall have a volume control. The Communication system should operate as follow:
 - a. Operator Station (qty 1) talk to:
 - (i) all students and pilot;
 - (ii) individual students; and
 - (iii) pilot only.

- b. Pilot Station (qty 1) talks to;
 - (i) all students and operator;
 - (ii) individual students; and
 - (iii) operator only.
- c. Student Stations (qty 8) talks to:
 - (i) operator; and
 - (ii) pilot.
- d. In addition two (2) systems shall be provided for visitor uses.

3.20.2 The IF and FAC Trainer shall be unaffected by any user provided radios that are brought into the training room.

3.21 **Graphic System**

3.21.1 The Graphics system on all virtual channels shall maintain a minimum frame rate of 30Hz. Screen objects and entities shall not pop into view or jump on the displayed image.

3.22 **System Accreditation**

3.22.1 The system should have the growth capability to be assessed as an accredited trainer at various levels for FAC training. Preferable the system should be fully accredited and in service with other NATO/ America, Britain, Australia (ABA) countries. As this may not be the case various levels of accreditation will be acceptable with the priority on full accreditation.

3.23 **Networking Capabilities**

3.23.1 The IF and FAC Trainer shall be High Level Architecture (HLA) IEEE1516 standard compliant to network with multiple simulators across a local and wide area network. The IF and FAC Trainer shall use the Real-time Platform Reference Federation Object Model (RPR FOM) Version 2.0D17. The requirement shall be for two or more IF and FAC Trainers to be linked such that they can share the same terrain scene with each IF and FAC Trainer portraying the same or a different Observation Post (OP) view of the terrain scene. This shall simulate anchor and remote OPs during the conduct of a Battery Commander's (BC) fire plan. All images of targets, friendly forces, munitions effects and all other scene elements shall be displayed on both IF and FAC Trainers. Data input to the common terrain scene shall occur at either or both IF and FAC Trainer locations as required by the operator. The linked IF and FAC Trainers shall be adjacent to each other in separate rooms or in completely separate geographic locations as required by the operator.

3.24 **Verification and Validation**

3.24.1 The IF and FAC Trainer shall use models and simulations which have been verified and validated to confirm that they reflect an accurate representation of the real world systems, phenomenon, and processes they are meant to represent.

3.25 **Design Features**

3.25.1 The IF and FAC Trainer shall be designed such that:

- a. regular setups and adjustments are kept to an absolute minimum as mentioned in para 3.1.2 "The operator shall be able to complete system start-up and shutdown in less than 15 minutes." These adjustments include (but are not limited to) the manual focus of projection systems, alignment and calibration of terrain views with their respective databases and computer system management duties;
- b. mechanical components be kept to a minimum;
- c. it shall be unaffected by any user provided military radios operated within the training room;
- d. the static system shall have a hard wired mechanical hour meter as a usage counter independent from computers or any other software counters;
- e. it shall have a round counter (type and ammo);
- f. normal system usage of eight hours per day, five days per week, 40 weeks per year be attainable;
- g. the system shall have a Mean Time Between Failure (MTBF) of not less than 1000 hours ($MTBF = \text{Hours of operation} / (\text{Major} + \text{Moderate failures})$ "over a 12 months period"). All major and moderate failures shall contribute to the MTBF. The IF and FAC Trainer failures shall be classified as follows:
 - (i) Major Failures - A major failure is defined as any failure which violates the Mission Essential Function and as such fails a mission; and
 - (ii) Moderate Failures - A moderate failure will be associated with any failure which causes an unscheduled maintenance action, but does not cause a mission failure. These failures include those for which training is hampered but not halted for a period not exceeding 15 minutes (ie system still able to perform its Mission Essential Function).
- i. the Mean Time To Repair (MTTR) shall be no more than:
 - (i) major failures - 72 clock-hours or less, and
 - (ii) moderate failures - 15 minutes or less.
- j. operator preventive maintenance activities shall occupy no more than 15 minutes per day; and
- k. beyond the diagnostic software supplied, no special tools or test equipment shall be necessary for normal operator maintenance.

3.26 **Portability**

- 3.26.1 Three of the acquired IF and FAC Trainers shall be portable for use overseas in theatre and in a temporary field-training environment.
- 3.26.2 The portable IF and FAC Trainer shall incorporate all appropriate protective cases to prevent hardware damage when in transport.
- 3.26.3 The individual components of the portable IF and FAC Trainer shall be portable in no more than two man lifts. Two men shall be able to dismantle and pack a system within 30 minutes and the system shall be set up and operational within the same constraints.

- 3.26.4 Dismantling, transporting, and reassembling the system shall be done using only common tools (Screwdrivers, wrenches etc). It shall not require the use of additional parts, spares, and test equipment.
- 3.26.5 The system shall be durable enough to withstand daily use, and monthly setup, tear down, and transport without deterioration in reliability and performance.

3.27 **Maintainability**

Note

This section should be read in conjunction with
Appendix 7 Contractor Conducted Logistic Support
(CCLS).

- 3.27.1 The IF and FAC Trainer shall be supported by Contractor Conducted Logistic Support (CCLS) for the duration of the system service life. Basic troubleshooting will be conducted at the unit level; however, the company will conduct any detailed repairs and maintenance.

3.28 **Electromagnetic Radiation**

- 3.28.1 All components within the IF and FAC Trainer shall comply with the appropriate requirements of the Department of Communications (DOC) or Federal Communications Commission (FCC) for shielding for the appropriate class of equipment.