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Gatineau
Quebec
K1A 0S5

LETTER OF INTEREST
LETTRE D'INTÉRÊT

Comments - Commentaires

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

Issuing Office - Bureau de distribution
Detection, Simulation and Optical Systems Division
Place du Portage III, 8C2
11 rue Laurier Street
Gatineau
Quebec
K1A 0S5

Title - Sujet RFI For AIEDDD Advanced Improvised Explosive Device Detection Defeat	
Solicitation No. - N° de l'invitation W8476-226486/A	Date 2021-10-21
Client Reference No. - N° de référence du client 6000542498	GETS Ref. No. - N° de réf. de SEAG PW-\$\$QT-006-28372
File No. - N° de dossier 006qt.W8476-226486	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM Eastern Standard Time EST on - le 2022-10-17 Heure Normale du l'Est HNE	
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: Martyn, Melanie	Buyer Id - Id de l'acheteur 006qt
Telephone No. - N° de téléphone (873) 353-9481 ()	FAX No. - N° de FAX () -
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: Specified Herein Précisé dans les présentes	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée See Herein – Voir ci-inclus	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	

If there is any discrepancy between the English and French document, the English document takes precedence.

W8476-226486/A

**Advanced Improvised Explosive Device Detection and Defeat (AIEDDD) Project
Request for Information (RFI) Process**

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1. Purpose and Nature of the RFI Process

This is the first of multiple potential engagement activities planned under this RFI process.

Public Services and Procurement Canada (PSPC) is requesting Industry feedback regarding the Advanced Improvised Explosive Device Detection and Defeat (AIEDDD) Project, for the Department of National Defence.

The closing date on the front page of this RFI is not the intended closing date. This RFI is to remain open until a formal solicitation process is released in the future. PSPC intends to release future engagement activity(ies) through independent RFI document(s), however under the same requirement number (W8476-226486). Each subsequent RFI document(s) will clearly identify the information Canada is requesting and the requested Industry response date.

Annex "A" Questions for Industry is attached to this RFI. Industry is requested to review these questions and provide answers to the PSPC Contracting Authority identified under Article 5, on or before **Friday, December 17th, 2021.**

The purpose of this RFI is to provide industry with an early opportunity to assess and comment on technical requirements, and later potentially obtain cost estimates in a future RFI, in order to maximize best value to Canada, while reducing potential problems when the bid solicitation is posted. This feedback will assist Canada in finalizing the requirements, and the RFI information herein will also provide potential Contractors an update on the procurement in preparation for the eventual bid solicitation.

This purpose of this RFI format is to:

- a. provide a continuous single point of official project communication with industry;
- b. collaborate with industry on the technical elements of the requirement;
- c. answer questions from industry to ensure all interested participants receive the same information;
- d. provide schedule updates; and
- e. hold industry meetings and engagement activities, as necessary.

The objective of this RFI process is to:

- a. ensure Canada's expectations for engagement are clear and easy for Industry to understand;
- b. foster innovation and deliver the best solution possible for Canada;
- c. fully understand potential AIEDDD solutions the market has to offer and leverage Industry expertise;
- d. to develop an efficient and effective procurement strategy that achieves the project's objectives and best value to Canada;
- e. proactively communicate Canada's commitment to acquire and support a AIEDDD capability through a fair, open, transparent, and competitive procurement process;
- f. communicate timely, relevant, and easy-to-understand information to ensure suppliers understand what the procurement process aims to achieve and how they can participate;
- g. foster productive and positive working relationships with the AIEDDD supplier community to ensure the project's objectives are achieved;
- h. advise Industry of potential engagement activities such as Industry Day events, site visits one-on one meetings and other potential engagement activities.

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This RFI process is not a Request for Proposal (RFP). No agreement or contract will be entered into based on this RFI process. The issuance of this RFI process is not to be considered in any way a commitment by Canada, nor as authority to potential Respondents to undertake any work that could be charged to Canada. This RFI process is not to be considered as a commitment to issue a subsequent solicitation or award contract(s) for the work described herein.

Although the information collected may be provided as commercial-in-confidence (and, if identified as such, will be treated accordingly by Canada), Canada may use the information to assist in drafting performance specifications (which are subject to change) and for budgetary purposes.

Respondents are encouraged to identify, in the information they share with Canada, any information that they feel is proprietary, third party or personal information. Please note that Canada may be obligated by law (e.g. in response to a request under the Access of Information and Privacy Act) to disclose proprietary or commercially-sensitive information concerning a respondent (for more information: <http://laws-lois.justice.gc.ca/eng/acts/a-1/>).

Respondents must be aware that aspects of their response may be used as a basis for modifying draft documents as Canada prepares for any potential future procurement(s).

Respondents are asked to identify if their response, or any part of their response, is subject to the Controlled Goods Regulations.

Participation in this RFI process is encouraged, but is not mandatory. There will be no short-listing of potential suppliers for the purposes of undertaking any future work as a result of this RFI. Similarly, participation in this RFI is not a condition or prerequisite for the participation in any potential subsequent solicitation.

Respondents will not be reimbursed for any cost incurred by participating in this RFI process.

Changes to this RFI may occur and will be advertised on the Government Electronic Tendering System.

Canada asks Respondents to visit Buyandsell.gc.ca regularly to check for changes, if any.

2. Background Information

The Canadian Armed Forces requires an operationally capable, technically advanced, sustainable, and deployable Counter Explosive Threat capability to ensure the freedom of movement of personnel and equipment across all types of terrain in support of the missions assigned by Canada. See Annex "A", Questions for Industry, for more information.

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3. Potential Scope and Constraints

3.1 National Security Exception

In regards to national security interests, at this time, Canada believes it will not likely invoke its right under national and international trade agreements, and not use a National Security Exception (NSE) for this procurement.

3.2 Industrial and Technological Benefits Policy

The Industrial and Technological Benefits (ITB) Policy, including value proposition, will not apply to the AIEDDD Project. Any potential winning Bidder(s) will not be required to undertake business activities in Canada equal to the value of any resultant contract(s).

4. Schedule

Canada is finalizing the procurement schedule which will be communicated under a future RFI amendment.

5. Contracting Authority

Interested Respondents may submit their responses, via email, to the PSPC Contracting Authority identified below:

Melanie Martyn
Supply Team Leader
Defence and Marine Procurement Branch
Public Services and Procurement Canada / Government of Canada
melanie.martyn@tpsgc-pwgsc.gc.ca
Tel: 873-353-9481

6. Questions Submitted by Industry

All enquiries and other communications related to this RFI process shall be directed exclusively, via email, to the PSPC Contracting Authority identified above. While Canada intends to respond to Industry questions by releasing answers periodically through subsequent RFI amendments, responding to questions will be handled on a best effort basis.

Often Canada may not be in a position to answer certain questions because requirements may not yet be finalized on various aspects of the requirement. Unanswered questions are still very valuable feedback as it allows Canada to see where Industry may have concerns, or where a different approach to a requirement may be possible.

As Industry feedback is submitted and reviewed for consideration over the course of the RFI process, Canada intends to periodically release updated versions of various draft RFP documents. These updated documents often answer questions submitted by Industry.

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7. Additional Information Requests

Throughout this RFI process, Public Service and Procurement Canada may request additional information, clarifications or site visits from Respondents.

8. Fairness Monitor

Canada has not engaged the services of a Fairness Monitor for this RFI process. Any resultant solicitation(s)/contract(s) that may be established from this RFI process may require the services of a Fairness Monitor, but shall be determined at that time, on a case-by-case basis.

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**ANNEX “A”
QUESTIONS FOR
INDUSTRY**

ADMINISTRATIVE MATTERS

1. Submission of Responses
2. Industry Information Session
3. Industry Responses
 - 3.1 Response Format
 - 3.2 Language of Response
 - 3.3 Response Parameters

TECHNICAL REQUIREMENTS

1. General
2. Technical Requirements
3. Additional Comments

ANNEX A - Requirements for Unmanned Ground Vehicle System (UGVS)

ANNEX B - Requirements for Mini Unmanned Aerial System (MUAS)

ANNEX C - Requirements for Hyperspectral Imagery Payload for Blackjack

ANNEX D.1 and ANNEX D.2 - Requirements for High Energy Laser (HEL) System

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Administrative Matters

1.0 Submission of Responses

It is requested that responses are submitted by e-mail to the Contracting Authority.

Responses submitted should be in either Microsoft Word or searchable PDF. Please note that PSCP has an email limit of 20mb so every attempt should be made to compress large files.

It is requested that Respondents provide their entire response in one submission, unless it surpasses 20mb, at which point multiple emails may be required. If this is the case, please ensure clear delineation of each submission.

The Respondent's name, return address and RFI solicitation number should be clearly visible on the response(s). Responses to this RFI will not be returned.

2.0 Industry Information Session

Should Respondents be interested in an information session, or a one on one meeting, then that should be requested in their response to PSCP.

3.0 Industry Responses

3.1 Response Format

For ease of use, and in order that the greatest value be gained from responses, Canada requests Respondents follow the structure outline under 'Technical Requirements', below. There is no page limit on the information to be provided.

3.2 Language of Response

Responses may be in English or French, at the preference of the Respondent.

3.3 Response Parameters

Respondents are reminded that this is an RFI and not a bid solicitation and, in that regard, Respondents should feel free to provide their comments, concerns, and, where applicable, alternative recommendations on how the requirement may be satisfied. Also, in responding to this RFI, Respondents are asked to clearly explain any assumptions they may wish to make.

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Technical Requirements

Respondents are requested to provide comments/feedback on the following information:

1.0 General

A brief corporate profile of the respondent (or the actual or intended respondent consortium) including name and phone number of a contact person, and an indication of level of interest in a potential Solicitation in whole or in part.

2.0 Technical Requirements

Technical requirements and/or industry questions are provided on five (5) Excel spreadsheets (in PDF format), and we ask that responses to these be provided back on those spreadsheets. Canada will not provide the Excel spreadsheets in original format.

ANNEX A - Requirements for Unmanned Ground Vehicle System (UGVS)

ANNEX B - Requirements for Mini Unmanned Aerial System (MUAS)

ANNEX C - Requirements for Hyperspectral Imagery Payload for Blackjack

ANNEX D.1 and ANNEX D.2 - Requirements for High Energy Laser (HEL) System

3.0 Additional Comments

Are there any additional comments and/or concerns with respect to this proposed procurement that has not been addressed elsewhere? If so, what alternative solution(s) would address your concern(s)

Respondents should provide their comments/concerns with their response submissions.

ANNEX "A"
REQUIREMENTS FOR UNMANNED GROUND VEHICLE SYSTEM (UGVS)

Ref.	Criteria	Possible Requirement	Achievable (Yes / No)	Comments
1	General	<p>The UGVS must include the following components:</p> <ul style="list-style-type: none"> a. One (1) Mini Unmanned Ground Vehicle (MUGV) System; b. One (1) Small Unmanned Ground Vehicle (SUGV) System; c. Two (2) Control and Communication System (CCS); d. One (1) MUGV hard transport container, and e. One (1) SUGV hard transport container. 		
2	Color	<p>The UGVS must have the predominant exterior colour (so that it contributes to and does not compromise a soldier's camouflage) of:</p> <ul style="list-style-type: none"> a. Flat/matte finish green; b. Flat/matte finish earth tone; c. Flat/matte finish grey, or d. Flat/matte finish black. 		
3	Interoperability	<p>The UGVS must be based on proven, fielded equipment, which is in-service with a North Atlantic Treaty Organization (NATO) or American, British, Canadian, Australian New Zealand (ABCANZ) military partner or police agency of those countries.</p>		
4	Environmental	<p>The UGVS must operate in temperatures ranging from -20°C to +39°C with no reduction in performance and durability.</p>		

5	Environmental	The UGVs must operate in blowing sand and dust caused by wind gusts up to 40 km/h over a period of no less than one (1) hour.		
6	Environmental	The UGVs components must operate in relative humidity ranging from 5% to 100%.		
7	Mobility	The UGVs MUGV and SUGV must maintain an average velocity of no less than five (5) km/h on a level pavement or concrete surface.		
8	Mobility	The UGVs MUGV and SUGV must traverse smooth polished surfaces, hard road surfaces, mud, fine sand, snow and ice.		
9	Battery Charging System	The UGVs must have Battery Charging Systems for the MUGV, SUGV and CCS .		
10	Battery Charging System	The UGVs Battery Charging Systems must provide a visual indication of battery charging in order to indicate when charging is in progress and when it is complete.		
11	Battery Charging System	The UGVs Battery Charging Systems must include a universal power input of 110VAC – 220VAC, 50Hz – 60Hz, with North American plug type.		
12	Battery Charging System	The UGVs Battery Charging Systems full re-charge time for one (1) Battery Set must be no more than eight (8) hours.		
13	Battery Charging System	The UGVs Battery Charging Systems must be certified CE, UL or equivalent.		
14	Battery Charging System	The UGVs Battery Charging System must recharge a minimum of one complete set of batteries.		

15	Electromagnetic Interference	The UGVs must comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules.		
16	Communication relay	The MUGV and SUGV must continually act as a mobile RF communication relay, in a mesh-type network, to assist with communication connection with other MUGV and SUGV in a non-line-of-sight, subterranean, or reinforced concrete buildings, or to extend the range in line-of-sight applications.		
17	Radio	The UGVs must use a MPU5 NSN 5975-01-658-9155 with S-Band module NSN 5998-01-658-8999 (2200-2507Mhz) and L-Band module NSN 5895-01-662-2670 (1350-1390Mhz) communication system from Persistent Systems to be interoperable with the current Canadian system. Please explain where the radio is installed on the robot.		
18	Radio Bandwidth	OR the UGVs must use 4400-4900Mhz (please explain if you are not able to use this bandwidth) if it's not possible to use a MPU 5 Radio on the UGV/CCS.		
19	Cleaning	The UGVs must allow cleaning of the exterior surfaces with hot and cold low pressure water, steam and detergents, without wear, deterioration or damage.		
20	Containers	The UGVs Hard Transport Containers must have no less than an IP66 rating, or equivalent, IAW NEMA IEC 60529		
Mini Unmanned Ground Vehicle (MUGV) System				

21	General	<p>The MUGV System must consist of the following components:</p> <ul style="list-style-type: none"> a. One (1) MUGV; b. One (1) Battery Charging System; c. One (1) Drop Charge Release Mechanism; d. One (1) ABL-2000L Disruptor Adaptor, and e. One (1) NEEDLE Plus Disruptor Adaptor. 		
22	Weight	The MUGV and CCS, with one (1) set of batteries each, must not exceed 10kg in combined weight.		
23	Size	The MUGV and CCS, with one (1) set of batteries each, must fit within the Soldier's Tactical Field Pack (NSN: 8465-20-000-2774). The Soldier's Tactical Field Pack (NSN: 8465-20-000-2774) has an available volume of height – 20 inches, width – 12 inches and depth – 8 inches.		
24	Mobility	The MUGV must climb and descend from obstacles (such as a road curb) of no less than a 10 cm height while carrying the minimum payload weight of 2kg.		
25	Mobility	The MUGV must traverse a dry grass-covered slope of no less than 15 degrees (26.8% grade) while carrying the minimum payload weight of 2kg.		
26	Mobility	The MUGV must climb and descend dry grass-covered slopes of no less than 30 degrees (57.7% grade) while carrying the minimum payload of 2kg.		
27	Mobility	The MUGV must hold position when not commanded to move, including when the MUGV is stopped on uneven ground or slopes and while carrying the minimum payload weight of 2kg.		

28	Battery	<p>The MUGV Battery Set and the CCS battery set must provide no less than one (1) hour of operation at an approximate ideal temperature of 20°C (+/- 3 °C). Operation is defined as:</p> <ul style="list-style-type: none"> a. Power-on and initialization sequence of the MUGV and CCS; b. Movement of the MUGV 'down range' for 100m, with periodic movements throughout the majority of the one (1) hour, and then returning back for 100m before the one (1) hour has expired, and c. Continuous video transmission (small fluctuations allowed) between the MUGV and CCS throughout the one (1) hour. 		
29	Battery	The MUGV System must have enough Battery Set(s) for six (6) hours of operation.		
30	Battery	The MUGV Battery Set must be replaced in no more than five (5) minutes.		
31	Drop Charge Release Mechanism	The MUGV Drop Charge Release Mechanism must support and hold the drop charge of 2kg while climbing and descending from obstacles (such as road curb) of no less than 10 cm.		
32	Drop Charge Release Mechanism	The MUGV Drop Charge Release Mechanism must carry and actuate the physical release of a drop charge (defined as two taped blocks of C4 explosive and RF Initiator), at least 1.60kg (approx. 3.53lbs) in weight and a maximum of 6cm width x 6cm height x 30cm length (approx. 2.36 x 2.36 x 11.80 inches).		
33	Drop Charge Release Mechanism	The MUGV Drop Charge Release Mechanism must be controllable through the CCS.		

34	Durability	The MUGV, when not equipped with the Drop Charge Release Mechanism, the NEEDLE Plus Adaptor or the ABL 2000 Adaptor must survive multiple throws with all possible landing angles from a height of no less than four (4) meters onto hard concrete, and remain fully functional.		
35	Durability	The MUGV, when not equipped with the Drop Charge Release Mechanism, the NEEDLE Plus adaptor or the ABL 2000 Adaptor, must have no less than an IP65 rating, or equivalent, IAW NEMA IEC 60529.		
36	Disruptor	The MUGV System must have an ABL 2000 disruptor adaptor.		
37	Disruptor	The MUGV System must have an NEEDLE Plus disruptor adaptor.		
38	CBRN Detector	<p>The MUGV must carry and operate a CBRN detector (to be provided by DND in the future), with detections/readings from the CBRN displayed on the CCS.</p> <p>Which CBRN detector is operable with your platform?</p> <p>How would the CBRN detector be mounted to the MUGV and through what connector can it be connected?</p> <p>Explain how the CBRN detector readings can be displayed on the CCS.</p>		
39	Mapping Camera/Sensor	<p>The MUGV System must have a mapping payload that can scan, and through software, reproduce a 2D image of building interior.</p> <p>Please explain the complete capability.</p> <p>Do you have an option for 3D map of the building interior?</p>		
40	Mapping Camera/Sensor	The MUGV 2D image produced by the mapping camera/sensor must be exportable on a computer thru a USB port or equivalent. Please explain.		

41	Front Field of View	<p>The MUGV must have an overall front field of view with the following:</p> <ul style="list-style-type: none"> a. Colour b. Low light near infra-red illumination c. No less than a 60 degree horizontal field of view; d. No less than a 90 degree vertical field of view upward, and 90 degree vertical field of view downward; and e. 640x480 or higher resolution: 		
42	Rear Field of View	<p>The MUGV must have an overall rear field of view with:</p> <ul style="list-style-type: none"> a. No less than a 60 degree horizontal field of view; b. No less than a 60 degree vertical field of view 		
Small Unmanned Ground Vehicle (SUGV) System				
43	General	<p>The SUGV System must consist of the following components:</p> <ul style="list-style-type: none"> a. One (1) SUGV; b. One (1) Battery Charging System; c. One (1) Manipulator Arm and Gripper; d. Two (2) NEEDLE Plus Disruptor mount; e. Two (2) ABL-2000L Disruptor mount; f. Two (2) ABL-3000L Disruptor mount; g. Two (2) PIGSTICK Disruptor mount; and h. Two (2) HOTROD Disruptor mount. 		
44	Size	The SUGV width must be no more than 450mm wide to fit in a commercial airplane aisle.		
45	Horizontal Reach	The SUGV horizontal reach beyond the front of the UGV must be no less than 1600mm (the horizontal reach must be done without an extension addition to the ROV arm)		

46	Vertical Reach	The SUGV must have a vertical reach no less than 2200mm to reach aircraft overhead storage bin (the vertical reach must be done without an extension addition to the ROV arm)		
47	Vertical Reach	<p>The SUGV Manipulator Arm must fire the following disruptors at the maximum vertical reach without damaging the UGV:</p> <ul style="list-style-type: none"> a. NEEDLE Plus; b. ABL-2000L; c. ABL-3000L; d. PIGSTICK; and e. HOTROD. 		
48	Vertical Reach	The SUGV manipulator gripper camera field of view at the maximal arm vertical height (2200mm) must be able to inspect everywhere inside aircraft overhead storage bin without an add-on attachment to the SUGV arm.		
49	Weight	<p>The SUGV, Manipulator Arm and Gripper, (not including the Fibre Optic Cable and Mount) and CCS, with one (1) set of batteries each, must not exceed 82kg in combined weight.</p> <p>If the UGV possesses a removable arm, it must be able to be reinstalled and be functional within one (1) minute.</p> <p>The weight of the removable arm must not exceed 50kg.</p>		
50	Mobility	The SUGV must climb and descend concrete stairs composed of step of no less than 216mm of height with a stair angle of no less than 45 degree while carrying the minimum payload weight of 20 Kg with the arm at the retracted position.		

51	Mobility	The SUGV must cross vertical obstacle walls of 500mm in height, while carrying the minimum payload weight of 20 Kg with arm at the retracted position.		
52	Mobility	The SUGV must traverse a dry grass-covered side slope of no less than 25 degrees (46.63% grade) while carrying the minimum payload weight of 20 Kg with arm at the retracted position		
53	Mobility	The SUGV must climb and descend dry grass-covered slopes of no less than 40 degrees (83.91% grade) while carrying the minimum payload weight of 20 Kg with arm at the retracted position.		
54	Mobility	The SUGV must ford water at a depth of no less than 300mm		
55	Automatic Brake	The SUGV must hold position when not commanded to move, including when the SUGV is stopped on uneven ground or 40 degrees slopes (83.91% grade) and while carrying the minimum payload weight, of 20Kg		
56	Fibre Optic	The SUGV must carry and feed-out and automatically rewind fibre optic cable of no less than 300m +/- 2m.		

57	Battery	<p>The SUGV System Battery Set must provide no less than two (2) hours of operation at an approximate ideal temperature of 20°C (+/- 3 °C). Operation is define as:</p> <ul style="list-style-type: none"> a. Power-on and initialization sequence of the SUGV and CCS; b. Movement of the SUGV 'down range' for 100m, with periodic movements throughout the majority of the two (2) hours, and then returning back for 100m before the two (2) hours has expired, and c. Continuous video transmission (small fluctuations allowed) between the SUGV and CCS throughout the Two (2) hours. 		
58	Battery	The SUGV System Battery Set must be replaced in no more than five (5) minutes.		
59	Battery	The SUGV System must have enough Battery Sets for eight (8) hours of operation.		
60	Durability	The SUGV equipped with the Manipulator Arm must have no less than an IP65 rating, or equivalent, IAW NEMA IEC 60529.		
61	Semi-Autonomous Mode	<p>The SUGV must have a semi-autonomous system that backtracks its route to the point where the UGV lost contact with the transmission signal.</p> <p>Please explain how this is done?</p>		
62	Payload	The SUGV Manipulator Arm and Gripper must lift from the ground and carry no less than a 18kg 200mm diameter smooth stainless pipe when the manipulator arm is fully retracted.		
63	Payload	The SUGV Manipulator Arm and Gripper must lift from the ground and carry no less than a 7kg 200mm diameter smooth stainless pipe when the Manipulator arm is fully extended to the front of the UGV.		

64	Front and Rear Field of View	<p>The SUGV must have an overall field of view from a front and rear camera, with following features:</p> <ul style="list-style-type: none"> a. Colour b. Low light near infra-red illumination c. No less than a 60 degree horizontal field of view; d. No less than a 60 degree vertical field of view; and e. 640x480 resolution or higher resolution. 		
65	Pan Tilt Camera	<p>The SUGV must have pan tilt camera with no less than the following features:</p> <ul style="list-style-type: none"> a. Infrared; b. Colour; c. 40X zoom; d. 360 degree horizontal rotation to have 360 degree field of view; e. 180 degree of vertical field of view; and f. 640 X 480 High Definition resolution 		
66	Gripper Camera	<p>The SUGV Manipulator Arm gripper camera must have a field of view with no less than the following feature:</p> <ul style="list-style-type: none"> a. No less than a 60 degree horizontal field of view; b. No less than a 60 degree vertical field of view; c. Pan no less than +/- 180 degrees (left and right) (Panning can be met either through the camera itself panning or Manipulator Arm panning); d. Tilt no less than +/- 90 degrees (up and down) (Tilting can be met either through the camera itself tilting or Manipulator Arm tilting); e. Low-light and near-infrared illuminators. f. Colour; g. 40X Optic zoom; and h. 640x480 HD resolution. 		
67	Lights	<p>The SUGV must have LED lights and IR for low light driving and on the manipulatr arms for operation.</p>		

68	Lights	The SUGV must have LED lights for night driving.		
69	Lights	The SUGV must have IR lights for night driving.		
70	Lights	The SUGV must have LED lights for manipulator arm operation.		
71	Lights	The SUGV must have Infra-Red lights for manipulator arm operation.		
72	Voice Communication	The SUGV must have integrated two-way audio communication allowing communication between personnel on the ground around the SUGV and the operator operating the CCS.		
73	GPS	The SUGV must have a Global Positioning system indicating the SUGV position when operating outside. No map is required, just the GPS coordinates.		
74	Manipulator Arm	<p>The SUGV Manipulator Arm must have no less than the following requirement:</p> <ul style="list-style-type: none"> a. Turret with no less than 90 degree horizontal rotation in each direction(left and right); b. Shoulder with no less than 180 degree of freedom; c. Elbow with no less than 270 degree of freedom; d. Wrist with no less than 300 degree of freedom; e. Claw rotation of no less than 360 degree of freedom; and f. Gripper opening no less than 200mm. 		

75	Pre set-pose	The SUGV Manipulator Arm and Gripper must have no less than three (3) factory pre-set poses allowing for rapid deployment or pack-up, including: a. Travelling pose; b. Weapon loading pose; c. Storage pose		
76	Disruptor mount(s)	The SUGV Manipulator Arm must carry and have two (2) disruptor mounts each, and sleeves if needed, for the following in-service barrel disruptors: a. NEEDLE Plus (Recoil) (NSN: 1385-99-485-3385); b. ABL-2000L (Recoilless) (NSN: 1385-99-151-5469); c. ABL-3000L (Recoilless) (NSN: 1385-99-447-0479) d. PIGSTICK (NSN 1385- 99-837-0467), and e. HOTROD (NSN 1385-99-755-2216).		
77	Aiming pointer	The SUGV must have a disruptor aiming pointer. This can be achieve by either the arm or gripper camera, or by a laser pointer or equivalent system.		
78	Range Finder	The SUGV must have a range finder to determine the distance between the gripper to the target.		
79	Firing Circuit	The SUGV must have no less than two (2) Electric Firing Circuits.		
80	Firing Circuit	SUGV must be designed to prevent the electric firing circuit from being fired unintentionally. A safety case showing how the circuit, and initiation command has been designed to be intrinsically safe must be submitted.		
81	Firing Circuit	The SUGV firing circuits must each initiate one electric detonator M6, the ABL-2000L, ABL-3000L, PIGSTICK, HOTROD and the NEEDLE Plus disruptor.		

82	Firing Circuit	The SUGV must have a built-in two (2) step action, to initiate the firing circuit, specifically the first action is to arm the system by holding the arm button, and the second action is the pressing of the fire button.		
83	Firing Circuit	The power must not go to the firing circuit prior to the activation of the first action (arm) in the two step action (arm+fire).		
84	Firing Circuit	If the SUGV loses contact with the CCS, the SUGV must have a failsafe that removes power from the firing circuit (goes to a safe state) in no more than 60 seconds of the contact loss. Please describe.		
85	Firing Circuit	The SUGV firing circuit must be electrically isolated to not use common-chassis grounding. Please describe.		
86	Firing Circuit	The SUGV must have a feature to conduct continuity checks from the CCS when an item is attached to the firing circuit. Please describe.		
87	Firing Circuit	The SUGV firing circuit must be protected (isolated) from an inadvertent activation when power is cycled to the UGV. Please describe.		
88	Firing Circuit	The SUGV must meet the requirements of RE102 IAW MIL-STD-461G, or other equivalent international standard, and meet the requirements of RS103 IAW MIL-STD-461G, or other equivalent international standard, for Army Ground levels from 2 MHz to 18 GHz. What is the standard used to meet this requirement?		

89	Disruptor	<p>The SUGV must carry not less than two (2) disruptors of the same kind or any possible mix between the NEEDLE Plus, ABL 2000, ABL 3000, PIGSTICK and HOTROD.</p> <p>Please explain if the two disruptors are carried by the arm at the same time ready to fire, or one of them is positioned in a disruptor carrier on the UGV.</p> <p>Also explain the process of changing between two disruptors if the stowed one is decided to be used by the operator at the last moment.</p>		
90	Shock tube	<p>The SUGV should have one (1) adaptor to fire in-service shock tube (standard size (3 mm) and mini-shock tube (2 mm)).</p> <p>In-service shock tube includes the following four (4) types:</p> <p>Skin pack short 30m overall length; 1375-01-631-2793</p> <p>Skin pack long 60m overall length; 1375-01-631-2796</p> <p>General Demolition spool short 150m: 1375-01-631-2790</p> <p>General Demolitions Spool Long 300m: 1375-01-631-2789</p>		
Control and Communication System (CCS)				
91	General	Each UGV must have their own CCS.		
92	General	The SUGV CCS must control both UGV.		
93	General	The MUGV CCS should control both UGV.		
94	Communication	The UGV CCS must have a Fibre Optic Cable connector and link to allow communication with and control of the SUGV		

95	Battery	The UGV CCS Battery Set must provide no less than two (2) hours of operation at an approximate ideal temperature of 20°C (+/- 3 °C)		
96	Battery	The UGV CCS Battery Set must be replaced in no more than one (1) minute.		
97	Durability	The UGV CCS must have no less than an IP64 rating, or equivalent, IAW NEMA IEC 60529		
98	Display Size	The UGV CCS screen size must be no less than 254mm.		
99	Display Resolution	The UGV CCS must have an Image Display with a minimum HD resolution of 640x480.		
100	Display Brightness	The UGV CCS must have an Image Display whose brightness is user adjustable for daylight (no less than 1000 nits) and low light viewing		
101	UGV Situational Awareness	The UGV CCS must display a 3D rendered image of the robot showing real-time relative positions of arm on the UGV.		
102	UGV Situational Awareness	The UGV CCS must have the ability to add and remove no less than a second simultaneous video feed from another camera and from the other UGV camera to gain a better Situational Awareness of the operation.		

103	Recordings	The UGV CCS must record and store no less than 20 hours of videos and 1000 images from the MUGV and SUGV cameras.		
104	Data exportation	The UGV CCS recorded data must be exportable to a portable computer. Explain how it's done.		

ANNEX "B" REQUIREMENTS FOR MINI UNMANNED AERIAL SYSTEM (MUAS)

Ref.	Criteria	Possible Requirement	Achievable (Yes / No)	Comments
Mini Unmanned Aerial System (MUAS)				
1	General	<p>The MUAS must include the following components:</p> <ul style="list-style-type: none"> a. One (1) Mini Unmanned Aerial Vehicle (MUAV); b. One (1) Control and Communication System (CCS); c. One (1) Battery Charging system; d. One (1) MUAS hard transport container; and e. One (1) soft transport case for carrying the MUAV, CCS and Battery charging system. 		
2	General	The MUAS time to assemble, aircraft boot up, GPS lock and be ready for take-off must be no more than two (2) minutes.		
3	Interoperability	The MUAS must be based on proven, fielded equipment, which is in-service with a North Atlantic Treaty Organization (NATO) or American, British, Canadian, Australian New-Zealand (ABCANZ) military partner or police agency of those countries.		
4	Environmental	The MUAS components must operate in relative humidity ranging from 5% to 100%.		
5	Battery Charging System	The MUAS must have a Battery charging System.		

6	Battery Charging System	The MUAS Battery Charging Systems must include a universal power input of 110VAC – 220VAC, 50Hz – 60Hz, with North American plug type.		
7	Battery Charging System	The MUAS Battery Charging Systems full re-charge time for one (1) Battery Set must be no more than two (2) hours.		
8	Battery Charging System	The MUAS Battery Charging Systems must be certified CE, UL or equivalent.		
9	Battery Charging System	The MUAS Battery Charging System must recharge four (4) battery sets at the same time, as follow: a. 2 X MUAV battery sets; and b. 2 X CCS battery sets.		
10	Battery Charging System	The MUAS Battery Charging System must indicate when each battery has reached a full charge.		
11	Electromagnetic Interference	The MUAS must comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules.		
12	Transmission	The MUAS transmission range must be no less than 4 Km.		

13	Transmission	<p>The MUAS must have a transmission encryption to protect the MUAS.</p> <p>What is the encryption that is used by the MUAS for data transmission?</p>		
14	Transmission	The MUAS transmitted Video Resolution must be no less than 720p.		
15	Transmission	<p>The MUAS must use 900MHz, 2.4GHz, 5.8GHz or another acceptable frequency for use in Canada.</p> <p>Please explain what bandwidths you operate on and if they can be changed.</p>		
16	Transmission	<p>Can your MUAS use the Persistent System Wave Relay (MPU 5 or embedded module) to establish secure communications with the CCS?</p> <p>If yes, is this communications package already used by your system or would it be a new integration?</p>		
17	Transmission	The MUAS latency must be no more than 200ms.		
18	Transport case	The MUAS hard transport case must be rated IP67, or equivalent, IAW NEMA IEC 60529.		
19	Transport case	The MUAS hard transport container must contain all MUAS components: The MUAV, CCS, Batteries, and Battery Chargers		
20	Transport case	The MUAS hard transport container must protect equipment from 2m drop.		

21	Transport case	The MUAS soft transport case must be compact and padded to protect the MUAV and the CCS when carried in a backpack.		
22	Transport case	The MUAS soft transport case must contain the MUAV, CCS, two (2) MUAV battery sets, two (2) CCS battery sets and one (1) complete set of rotor blades for each motor.		
Mini Unmanned Aerial Vehicle (MUAV)				
23	General	The MUAV must be a rotary aircraft platform.		
24	Environmental	The MUAV must have an Ingress Protection of no less than IP53, or equivalent, IAW NEMA IEC 60529.		
25	Mobility	The MUAV must maintain an average horizontal speed of no less than 12.5 m/s (45 km/h).		
26	Mobility	The MUAV must maintain a climb rate of no less than 5m/s (18km/h).		
27	Mobility	The MUAV must operate at an Above Sea Level (ASL) altitude of no less than 4500m (14763.78 ft)		
28	Mobility	The MUAV must operate at an Above Ground Level altitude of no less than 480m (1574.8 ft)		

29	Mobility	The MUAV must stabilize itself in a constant wind of no less than 35 km/h.		
30	Mobility	The MUAV must be launched by hand by a soldier wearing combat gloves or ground launch on any type of ground without any addition or modification on the aircraft.		
31	Battery	<p>The MUAV Battery Set must provide no less than 30 minutes of operation at a temperature of -20°C (+/- 3 °C) with no wind.</p> <p>Operation is defined as:</p> <ul style="list-style-type: none"> a. Power-on and initialization sequence of the MUAV and CCS; b. Movement of the MUAV 'down range' for 1Km at a speed no less than 10Km/h, with periodic movements throughout the majority of the 30 minutes, and then returning back for 1Km before the 30 minutes has expired, and c. Continuous video transmission between the MUAV and CCS throughout the 30 minutes. 		
32	Battery	The MUAV Battery Set must be replaced in no more than one (1) minute.		
33	Folded Size	The MUAV folded size must be no more than 310mm X 150mm X 100mm.		
34	Unfolded Size	The MUAV unfolded size must be no more than 665mm X 570mm X 220mm.		
35	Weight	The MUAV weight including the battery must be no more than 1.5 kg.		

36	Autopilot Features	<p>The MUAV must have an autopilot with the following features:</p> <ul style="list-style-type: none"> a. Automatic Stabilization; b. GPS position hold; c. GPS waypoint navigation; d. Return Home (point of launch and/or where the CCS location is upon Return); e. Auto Take-off; f. Auto-Landing; g. Automatic return to home failsafes for loss of communications and low battery, and h. Built-in obstacle avoidance. <p>Please specify obstacle size and the maximum speed that the MUAV can reach while using this feature.</p>		
37	GPS	The MUAV must include a GPS to indicate the MUAV position coordinates and coordinates of where the camera is focusing.		
30	Camera	<p>The MUAV must have one (1) pan tilt camera with no less than the following features:</p> <ul style="list-style-type: none"> a. Electro-Optic / Infrared (EO/IR); b. 4K UHD Colour; c. 2X optical zoom; d. 360 degree horizontal rotation to have 360 degree field of view e. Camera Horizontal Field of View of no less than 90 degrees. f. 180 degree of vertical field of view; and g. 320 X 240 Thermal resolution. 		

31	Camera Stabilization	The MUAV must use a minimum of 2-axis mechanically stabilized camera system.		
32	Lights	The MUAV must have LED lights for night operation. Please provide the light specification including the number of lumens and the maximum distance that the light are efficient.		
33	Tactical Flight	The MUAV must have IR lights visible to EO/IR camera for night tactical operation. Please provide the light specification		
34	Tactical Flight	The MUAV sound pressure level must be no more than 40dBA at 50m off the ground.		
41	Data	The MUAV recorded video must use at least H264 video compression.		
42	Data	The MUAV must have no less than a 64 GB micro SD card.		
43	Data	The MUAV Micro SD card must be encrypted with AES-XTS 256 bit key length.		
Control and Communication System (CCS)				
49	Size	The CCS size must be no more than 350mm X 260mm X 80mm.		
50	weight	The CCS weight, including the battery, must be no more than 1.75kg (2 lbs).		

51	Battery	<p>The CCS Battery life must be no less than 3hrs operation at an approximate ideal temperature of 20°C (+/- 3 °C) . Operation is define as:</p> <ul style="list-style-type: none"> a. Power-on and initialization sequence of the MUAV and CCS; b. Movement of the MUAV ‘down range’ for 1Km, with periodic movements throughout the majority of the 30 minutes, and then returning back for 1Km before the 30 minutes has expired, and c. Continuous video transmission between the MUAV and CCS throughout the 30 minutes. 		
52	Battery	The CCS Battery Set must be replaced in no more than one (1) minute.		
56	Durability	The CCS must have no less than an IP53 rating, or equivalent, IAW NEMA IEC 60529.		
57	Display Size	The CCS screen size must be no less than 165.1mm (6.5 inches) measured diagonally.		
58	Display Resolution	The CCS must have an Image Display with a minimum HD resolution of 720p.		
59	Display Brightness	The CCS display brightness must be no less than 500 cd/m ² .		
60	Display Brightness	The CCS must have an Image Display whose brightness is user adjustable for daylight and low light viewing		
61	Display Brightness	The CCS must have a display cover to hide light from the screen for tactical operation and to shield the screen for use in direct sunlight.		

62	Recordings	The CCS must record and store no less than 20 hours of videos and 1000 images.		
63	Data exportation	The CCS recorded data must be exportable to a portable computer. Explain how it's done.		
64	Environmental	The CCS must operate in all environmental conditions in temperatures ranging from -30°C to +39°C with no reduction in performance and durability.		
65	Environmental	The CCS components must operate in relative humidity ranging from 5% to 100%.		
66	Operational	The CCS must be operable by a soldier wearing combat gloves and eye protection.		

ANNEX "C" REQUIREMENTS FOR HYPERSPECTRAL IMAGERY PAYLOAD FOR BLACKJACK		
Ref.	Questions to industry	Answer
1	What payload solutions can you offer for the detection of surface and buried explosive threats that can be mounted on a Blackjack UAV? Please describe your solution?	
2	<p>Could you provide a list, or description of the type(s), of buried and unburied explosive threats that can be detected by your solution and under what conditions? This list must include the following at a minimum:</p> <p>For all targets:</p> <ul style="list-style-type: none"> a. Target Size; b. Target Shape; c. Target material composition; d. Target explosive type; <p>Specific to Buried targets:</p> <ul style="list-style-type: none"> a. Soil composition; b. Soil moisture; c. Type of target concealment; and d. depth of the target. 	
3	What information on the explosive threat can your solution provide after a possible detection?	
4	Is your solution able to detect soil disturbance to indicate a recent digging locations?	
5	Is your solution able to do detections during nighttime?	
6	Is your solution able to operate and continue detecting in the range of weather conditions that the Blackjack UAV is able to fly in? If not, what weather conditions can your solution operate in?	
7	Is your solution doing real time detection?	
8	Is there post processing that is required to be done in order to pinpoint potential explosive threat locations? If so, what software and manual processes are required by operators and analysts?	
9	Can you describe the process of detection as it relates to operator control and image interpretation from an analyst?	
10	What is the percentage of detection that is automated without the need for an operator? And what is the percentage of false positives?	
11	What is the durability and ingress protection of your payload?	

12	What are the steady state and peak power requirements of the detection payload when it is operating onboard the Blackjack UAV?	
13	Can you provide the complete technical specifications for your solution?	
14	What range of temperatures will your solution operate within?	
15	What are the minimum and maximum altitudes for your solution to effectively detect explosive threats?	
16	What is the minimum and maximum flying speed that your solution requires to be effective?	

ANNEX "D.1" REQUIREMENTS FOR HIGH ENERGY LASER (HEL) SYSTEM				
Ref.	Criteria	Possible Requirement	Achievable (Yes / No)	Comments
1	General	<p>The HEL System must be designed to engage and neutralize unexploded ordnance (UXO) and improvised explosive devices (IEDs) with a high energy laser beam.</p> <p>The beam is delivered on target through optics mounted on a Remote Weapon System (RWS) which also includes a .50 caliber machine gun.</p>		
2	Components	<p>The HEL System must include the following components:</p> <ul style="list-style-type: none"> a. One (1) High Energy Laser (HEL); b. One (1) HEL cooling system; c. One (1) 0.50 Cal RWS; d. One (1) Control Station; and e. One (1) Reconnaissance software. 		
3	Proven system	<p>The HEL System must be based on proven, fielded equipment, which is in-service with a North Atlantic Treaty Organization (NATO) or American, British, Canadian, Australian, New Zealand (ABCANZ) military partner or police agency of those countries. If the system was fielded with a country that is not listed above, please provide with whom the equipment is fielded.</p>		
4	HEL Source	The HEL must be infrared continuous wave solid-state laser single-mode technology.		
5	HEL Power	The HEL power must be not less than 3kW.		

6	HEL Power	The HEL power must be adjustable from the control station in increments from 10% to 100% of its maximum optical power.		
7	Cooling system	The HEL cooling system must be independent from the vehicle. Please describe.		
8	Cooling system	The HEL cooling system must cool down the laser during continuous firing time of no less than three (3) minutes at maximum power.		
9	RWS	The HEL beam delivery system must be mounted on a stabilized 0.50 cal RWS. Please describe.		
10	RWS	The HEL beam delivery system must be delivered with a stabilised 0.50cal RWS that is currently supportable by the OEM.		
11	RWS	The RWS HEL beam delivery system must have a minimum engagement distance of no more than 50m.		
12	RWS	The HEL beam delivery system must not reduce the maximum range of the 0.50 cal weapon system.		
13	RWS HEL beam delivery system protection	The RWS HEL beam delivery system must have a remotely-operated optics protection cover. Please describe.		
14	Control Station	The RWS and the HEL system must be a single control station operated by one (1) operator. Please describe.		

15	Control Station	<p>The Control Station must operate the following equipment mounted on the RWS:</p> <ul style="list-style-type: none"> a. Optics; b. HEL; c. 0.50 cal Machine gun; d. laser pointers; e. Rangefinder; and f. Reconnaissance software. 		
16	Control Station	<p>The Control Station screen must have the following features:</p> <ul style="list-style-type: none"> a. Size no less than 457mm, measured diagonally; b. Color; c. 640X480 resolution ; d. Adjustable brightness for daylight and low light viewing; 		
17	Control Station	The Control Station must have a feature to rapidly switch between the HEL beam delivery system and the .50 cal machine gun.		
18	Control Station	The Control Station display must have an indicative crosshair at the location where the HEL beam will impact the target.		
19	RWS aiming laser pointer	<p>The RWS must have a green laser pointer, visible in daytime under sunlight, boresighted with the HEL beam delivery system.</p> <p>Please describe.</p>		
20	RWS aiming laser pointer	<p>The RWS aiming pointer must have a nighttime infrared setting.</p> <p>Please describe.</p>		

21	RWS Optics	The RWS optics must be boresight with the HEL beam with an optical magnification to have aiming precision of 1cm at 300m.		
22	RWS Optics	The RWS optics must be the same for the RWS machine gun and for the HEL laser beam delivery system.		
23	RWS Optics	The RWS optics must be able to focus the optical beam to engage smaller targets at the maximum 0.50 cal range. Please describe.		
24	RWS Optics	The RWS optics must have a zoom powerful enough to accurately engage a target at the maximum 0.50 cal range. Please describe.		
25	RWS Optics	The RWS optics must have a thermal camera and visible/short-wave infrared camera. Please describe.		
26	RWS Optics	The RWS Optics must have a laser rangefinder with an accuracy of +/- 1m at the maximum 0.50 cal range. Please describe.		
27	RWS Optics	The RWS Optics must be in colour for daytime operation.		
28	HEL Power Supply	The HEL power management, storage and distribution system integration must be done from the vehicle electrical system (an upgrade of the vehicle electrical system is possible). Please describe.		
29	HEL Integration	The HEL system must be integrated on a 6X6 Cougar Mine-Resistant Ambush Protected (MRAP) vehicle.		

30	HEL Integration	<p>The HEL integration must include appropriate laser protection on all vehicle window surfaces. As follow:</p> <p>a. No less than Optical Density 5; and</p> <p>b. Visible light Transmission of no less than 70%</p>		
31	HEL Integration	<p>The HEL integration must include a door safe sensor/switch making it impossible to fire the laser when the vehicle doors are open.</p>		
32	HEL Integration	<p>The HEL door safe sensor/switch must be positioned in such way that it won't interfere with personnel mounting and dismounting the vehicle.</p>		
33	HEL Integration	<p>The HEL door safe sensor/switch must located and made to not be clogged by dirt and mud.</p>		

32	Reconnaissance Software	<p>The HEL/RWS must include a software to conduct reconnaissance on UXO and IED from the RWS optics at a distance of no less than 500m with the following features:</p> <ul style="list-style-type: none"> a. Control the optical focus and zoom to read all markings on exposed 155mm howitzer UXO to determine type and attack method; b. Accurate measurement from the Control Station screen to determine munition diameter and length with a measurement range capability of no less than 40mm to 3500mm; c. Target location from the GPS input; d. Recording video feed during each HEL engagement; e. Target picture snap shot; f. Draw and put annotation on the picture from the control station screen; and g. exporting information on USB stick or similar electronic storage device. <p>Please provide your solution to achieve the above requirement.</p>		
33	Tire protection	The vehicle integration must include tire shrapnel protection to protect front and the two rear tires of the vehicle during the target engagement.		
34	Tire protection	The tire protection if permanently installed, must not change the vehicle mobility in any way.		
35	Tire protection	The tire protection, if not permanent, must not take more than 5 minutes to be installed and removed.		

ANNEX "D.2" REQUIREMENTS FOR HIGH ENERGY LASER (HEL) TRAILER					
Ref.	Criteria	Possible Requirement	Final Question(s)	Achievable (Yes / No)	Comments
1	General	The HEL trailer must be designed to engage and neutralize unexploded ordnance (UXO) with a high energy laser beam at no less than 500m range from the rear of the trailer. The High Energy Laser (HEL) beam is delivered on target through optics mounted inside the trailer.			
2	Components	The HEL trailer must include the following components: a. One (1) HEL; b. One (1) HEL cooling system (Chiller); c. One (1) Transportable HEL Control Station; d. One (1) Generator; and e. One (1) Trailer.			
3	Proven system	The trailer must be the latest model from a manufacturer who has sold, in North America, this type and size class of trailer for at least three (3) years.			
4	Trailer Regulations	The HEL trailer must conform to all applicable laws, regulations and industrial standards governing manufacturing and safety in effect in Canada at the time of manufacture.			
5	Weather	The HEL Trailer must operate under the extremes of weather conditions found in Canada in temperatures ranging from -40°C to 40°C.			
6	Terrain	The HEL Trailer must operate on highways, secondary roads and gravel and dirt roads in year round operations, including snow and ice conditions.			

7	Vehicle Safety Regulation	The HEL Trailer must meet the provisions of the Canada Motor Vehicle Safety Act in effect on the date of manufacture of the trailer.			
8	Hazardous Materials	The HEL Trailer must comply with the Hazardous Products Act of Canada concerning the use of hazardous materials, ozone depleting substances, polychlorinated biphenyls, asbestos and heavy metals used in the manufacture and assembly.			
9	GVWR	The HEL trailer Gross Vehicle Weight Rating (GVWR) must not exceed 3175 kg (7000 lbs).			
10	GVWR	The HEL trailer drawbar vertical load must be limited to 15% of the trailer GVWR.			
11	Speed	The HEL trailer must be towed with a full payload on highways and secondary roads at speeds of no less than 100 km/h.			
12	Towing Ability	The HEL trailer must follow the towing vehicle without weaving or side sway.			
13	Towing Ability	The HEL trailer must provide horizontal articulation up to 60 degrees (30° either side of the direction of travel) without interference with the towing vehicle.			
14	Trailer Overview	The HEL trailer must be enclosed with armour protection Level 3 from AEP 55 (c), to protect the HEL cooling system, Control Station, and Generator from blast and fragmentation from the rear, sides and roof. The enclosure must provide protection for all weather conditions. Please Describe.			
15	Trailer Length	The HEL trailer exterior length must be no more than 6.096m.			
16	Trailer Height	The HEL trailer must have an internal ceiling height of no less than 2.072m.			

17	Trailer Height	The HEL trailer external height must be no more than 4.15m to meet Canadian provincial vehicle size regulations.			
18	Trailer width	The HEL trailer exterior width must be no more than 2.6m to meet Canadian provincial vehicle size regulations.			
19	Trailer Floor	The HEL trailer flooring must have a non-skid surface of a type qualified by the National Floor Safety Institute.			
20	Trailer Frame	The HEL trailer must have either a 100% hot dipped galvanized steel frame or 100% hot dipped galvanized steel clad construction.			
21	Trailer walls and roof	The HEL trailer walls, access doors and roof must be reinforced with armour level 3 protecting the interior equipment from incoming blast and shrapnel.			
22	Trailer Tongue	The HEL trailer must have a permanent tongue support with docking pad.			
23	Trailer Tongue	The HEL trailer tongue must have a support for the tongue lift and support a fully loaded trailer.			
24	Trailer Tongue	The tongue support must be retractable or foldable to be stowed when the trailer is being towed.			
25	Trailer Stone Guard	The HEL trailer must have a stone guard on the front, of 61.0 cm (24 in) height from the bottom front face of the trailer.			
26	Trailer Stabilizers	The HEL trailer must have stabilizers (of either Jack or Drop style).			
27	Trailer Hitch	The HEL trailer must have 2-5/16" trailer ball hitch or larger suitable for the GVWR.			

28	Trailer Hitch	The HEL trailer must have two (2) suitably sized safety chains with snap hooks.			
29	Trailer Hitch	The HEL trailer safety chains must be in accordance with SAE Recommended Practice J697.			
30	Trailer Harness Connector Plug	The HEL trailer must be equipped with a harness connector plug for protecting and securing the trailer's wire harness connector for periods of disconnected storage.			
31	Trailer Harness Connector Plug	The HEL trailer harness connector plug must be a "Connect-to-Protect" by Hanington Innovations or equivalent.			
32	Trailer Harness Connector Plug	The HEL trailer harness connector plug guard must be mounted on the trailer tongue at a location which prevents the electrical connection from making contact with the ground when used.			
33	Trailer Electrical System	The HEL trailer must have a 12V electrical system, including: a. an absorbed glass mat (AGM) deep cycle battery sufficient to power the 12V lighting, b. a low-voltage disconnect switch, and c. a 12V fuse panel.			
34	Trailer Electrical System	The HEL trailer must have a negative ground electrical system.			
35	Trailer Electrical System	The HEL trailer must have a 7-pin, primary cable plug in accordance with SAE J560.			
36	Trailer Electrical System	The HEL trailer's 12 V electrical system must comply with CSA C22.			

37	Trailer exterior light	The HEL trailer must have external 12 volt lights in accordance with CMVSS.			
38	Trailer exterior light	The HEL trailer lighting must be protected by guards or mounted in a location to prevent damage.			
39	Grounding	The HEL trailer must have a grounding point and ground rod with electrical connector, for the purpose of electric circuit grounding and to minimize electrostatic discharge in the trailer.			
40	Trailer brake	The HEL trailer must have a manufacturer's standard electric braking system.			
41	Trailer Suspension	The HEL trailer must successfully pass vibration testing IAW MIL-STD-810H, Method 514.8, ANNEX C, Category 5 (Truck/Trailer - Loose Cargo) for a duration of 60 minutes to prevent damage to the equipment during movement on a dirt road.			
42	Trailer Suspension	The HEL trailer suspension must have a capacity of not less than the GVWR.			
43	Trailer Axle(s)	The HEL trailer axle(s) must have a capacity of not less than the GVWR			
44	Trailer Tires	The HEL trailer tires must be tubeless radial tires with all-weather treads			
45	Trailer Tires	The HEL trailer tire pressure must be marked near the tire location.			
46	Trailer Tires	The HEL trailer must have a spare wheel assembly, mounted on the outside at the front, that is identical to the wheels provided on the trailer.			
47	Trailer Rims	The HEL trailer rims must be single piece steel rims.			

48	Trailer Wheel Replacement Equipment	The HEL trailer must be provided with a jack and wheel nut wrench, whose location may not obstruct ordinary use of the trailer (recessed location is preferred).			
49	Lubricants	The HEL trailer must be provided with and be serviceable with non-proprietary lubricants.			
50	Lubricants	The HEL trailer lubrication fittings must conform to SAE J534.			
51	Corrosion Protection	The HEL trailer must be provided with a corrosion protective coating.			
52	Corrosion Protection	The HEL trailer protective coating must completely cover the trailer's entire metal frame.			
53	Corrosion Protection	The HEL trailer's hardware (including all hinges, latches, tie-in components) must be composed of either aluminium, stainless steel, or plated steel to minimize corrosion. Where dissimilar metals meet, appropriate preventative measures such as non-absorbent insulate, tape, etc, must be used.			
54	Paint	The HEL trailer must be painted white using the manufacturer's standard commercial painting.			
55	Identification	<p>The HEL trailer must have the following information permanently marked in a conspicuous and protected location:</p> <ul style="list-style-type: none"> a. Manufacturer's name, model and serial number; b. Manufacturer's Vehicle Identification Number (VIN); c. Trailer Capacity (Payload or GTWR) rating marked on the drawbar; and d. Centre of gravity of loaded trailer. 			
56	Labels	The HEL trailers warning and instruction labels must be in a bilingual (English and French) format or ISO symbol format.			

57	Warning, Markings and Instruction Plates	The HEL trailers dangerous goods placard holders must be provided and located on each side of the trailer as per CSA B620 standard.			
58	License plate Holder	The HEL trailer must be provided with a rear mounted license plate holder.			
59	License Plate Holder	The placement of the license plate holder must comply with CMVSS.			
60	Trailer Stability	The HEL trailer must be stable to deliver and maintain a 1 cm-diameter (1/e2) HEL spot at 300 m. Please describe.			
61	Trailer Warning System	The HEL trailer must have external visual rotating warning lights indicating when the HEL is armed and when it is emitting. (whoopy lights)			
62	Trailer compartment	The HEL trailer must be divided in three compartments as follows: a. Front compartment for the generator toward the hitch; b. Middle compartment composed of the HEL and the cooling system and HEL Control Station (HCS); and c. Rear compartment for the optics.			
63	Trailer Compartment Access	Each of the HEL trailer compartments must have doors to access the specific compartments from outside.			
64	Trailer Compartment access	The middle compartment must have a door to gain access to the rear compartment from inside the HEL trailer.			
65	Trailer Generator Division	The division between the generator and the middle compartement must be air tight to keep the generator fumes outside of the other compartments.			

66	Trailer Middle and Rear Division	The HEL trailer division wall between the rear compartment and the middle compartment, including the door must be armour rated level 3 as per AEP 55 c to protect the laser from possible shrapnel coming from a possible target explosion.			
67	Trailer Rear Doors	The HEL trailer must have double doors on the rear of the trailer with an Optic access trapdoor permitting the laser beam to go thru the rear trailer doors when the doors are closed.			
68	Trailer Rear Doors	The HEL trailer doors must have locks with a folding bar mechanism (sea container style).			
69	HEL Power Supply	The HEL power management, storage and distribution system integration must be done from the trailer generator.			
70	Electric Regulation	The HEL trailer electrical system must comply with CSA C22.1.			
71	Generator	<p>The HEL trailer generator must provide enough power to support the following equipment, without power fluctuations, when all the equipment is turned on at the same time:</p> <ul style="list-style-type: none"> a. HEL; b. Optics; c. Aiming Laser; d. Cooling system; e. Heating system; f. Load Bank; g. Trailer interior lighting system; h. Trailer ventilation; and e. Control Station. 			
72	Generator	The HEL generator must sustain eight (8) hours of operation, with all electric equipment running at the same time and with the HEL performing 20 shots per hour, without having to be refueled.			
73	Generator	The HEL generator fuel tank must be refilled from outside the trailer.			

74	Generator	The HEL generator fuel tank must be refuelled by hand-carried fuel container by a person standing on the ground beside the trailer without having to use the help of a ladder or a step.			
75	Generator	The HEL generator fuel tank must be refuelled by a fuel Pod, NSN 4930-20-003-5701			
76	Generator	The HEL Generator exhaust location must be positioned in such way that it will direct the fumes away from the trailer.			
77	Generator Fuel	The HEL generator must use diesel grade fuel, operating on all primary and alternate fuel types stated in STANAG 4362 Edition 03.			
78	Generator control	<p>The HEL generator must have a control panel including the following features :</p> <ul style="list-style-type: none"> a. Engine start and stop; b. Emergency stop button; c. Power output gauge; d. Fuel gauge. <p>Please Describe.</p>			
79	Middle Compartment	<p>The HEL Trailer middle compartment must include the following equipment :</p> <ul style="list-style-type: none"> a. HEL; b. Cooling System; c. Lighting system; d. Heating and ventilation system; e. Armoured access doors to the rear compartment; f. Access doors to generator compartment (if required); g. HCS; h. Breakers; and i. Fire suppression system 			

80	HEL	The HEL inside the trailer must be the same that the one used with the RWS version.			
81	HEL Power	The HEL must be no less than a 3Kw Laser.			
82	HEL Power Control	The HEL power must be adjustable from the control station in increments of 10%, from 10% to 100% of its maximum optical power.			
83	HEL Breaker	The HEL must have its own breaker.			
84	HEL safety	The HEL must have an emergency button to shut down the system in case of an emergency.			
85	HEL Safety	The HEL must have a safety on the side and rear doors not allowing the laser to fire when the doors are not closed. Only when the Optic access trapdoor on the rear doors is open.			
86	Cooling system	The HEL cooling system must be independent from HEL. Please describe.			
87	Cooling system	The HEL cooling system must provide sufficient cooling for a continuous three (3) minute maximum power engagement.			
88	Cooling system Breaker	The HEL Cooling system must have its own breaker.			
89	Ventilation	The HEL trailer middle compartment must have a fan to evacuate excess heat during prolonged HEL operations.			
90	Ventilation	The fan must be sealed to operate during all weather condition without having water coming inside the trailer.			
91	Ventilation	The HEL trailer middle compartment must have enough air intake to compensate for the air evacuated by the fan, providing good air circulation in the compartment.			

92	Ventilation	The HEL trailer middle compartment air intake must be water tight.			
93	Heating	The HEL trailer middle compartment must have a heater with a thermostat to keep the the HEL above the freezing point during winter operations down to (-40 degree C) ambient temperature.			
94	Heating Breaker	The Heating system must have its own breaker.			
95	Interior Light	The HEL trailer middle and rear compartments must be provided with recessed (flush to ceiling) 12V lighting. Lighting must provide illumination for the entire trailer individual compartment interiors, with a minimum of 500 lux (lumen/m 2, or 50 foot candles).			
96	Interior light	All lighting assemblies must be LEDs.			
97	Power Outlet	The HEL trailer middle compartment must have no less than three (3) additional power outlets of 120VAC. (not including the one used for the control station.)			
98	Power Outlet	The HEL trailer rear compartment must have no less than two (2) additional power outlets of 120VAC.			
99	Power Outlet	The HEL trailer must have one power outlet of 110V on the exterior of each side of the trailer.			
100	Interior Lighting Breaker	The interior trailer lighting system must have its own breaker.			
101	Power Outlet Breaker	The HEL trailer power outlets must have their own electrical breaker for each compartment (one for the rear compartment, and one for the middle compartment).			
102	Control Station	The HEL Control Station (HCS) must be located in the middle compartment of the trailer.			

103	Control Station	The HCS must be dismountable from the trailer to operate the HEL from a bunker located 100m from the trailer. Please Describe.			
104	Control Station	The HCS must operate the following equipment: a. Optics; b. HEL; c. HEL power adjustment; d. Aiming laser; e. Zoom; and f. Rangefinder.			
105	Control Station	The HCS must show error messages, and audible and visual warning systems, to alert the operator of any situation concerning the HEL, cooling system and power that may be unsafe or outside of the normal operating conditions.			
106	Control Station	The HCS must include a HEL shutdown switch in case of an emergency.			
107	Control Station	The HCS must not permit the activation or operation of functions which that will damage the equipment and operation that cause harm to the operator.			
108	Control Station	The HCS must be equipped with an information display screen that is operable under all light conditions.			
109	Control Station	The HCS must be equipped with a means to reduce the glare on the display screen			
111	Control Station	The HCS must be equipped with a guard system that prevents accidental activation of switches and/or actuators, with the exception of the emergency stop switch			
112	Control Station	The HCS must be IP65 or equivalent.			

113	Control Station	The HCS must be operable when wearing gloves.			
114	Control Station	The HCS must incorporate a two-level safety interlock including a key			
115	Control Station Screen	The HCS screen must have the following features: a. 381mm (15 inch) diagonally; b. Color; c. High Definition; d. Indicative crosshair at the location with the HEL beam will impact the target.			
116	Control Station Weight	The HCS weight must be no more than 50 lbs.			
117	Control Station Tray	The HCS must be installed on a wheeled movable cart to operate the laser from a remote location.			
118	Control Station Transport Mode	The HCS must have a dedicated location in the middle compartment to be stored and secured for transportation as well as to be operable from that location.			
119	Rampe access	The HEL middle compartment must have a storable ramp to load and unload the control station.			

120	Rear Compartment	<p>The HEL Trailer rear compartment must include the following equipment:</p> <ul style="list-style-type: none"> a. Rear armour door (including the laser Optic access trap); b. Compartment Observation camera; c. Targeting Camera; d. Beam Expander; e. Aiming Laser; d. Optical stand; f. Pan and tilt system; g. Range finder; and h. lighting system. 				
121	Aiming laser	The HEL Optics must have a daytime green visible in sunlight aiming laser pointer, boresighted with the HEL beam delivery system.				
122	Aiming laser	The HEL Optics aiming laser must have a nighttime infrared setting. Please describe.				
123	Aiming and targeting system	The HEL aiming and targeting system must be able to engage a munition of 60mm in diameter at a range of no less than 300m.				
124	Aiming and targeting system	The HEL Optics must be boresighted with the HEL beam with an optical magnification to have aiming precision of 1cm at 300m.				
125	Range Finder	The HEL Optics must have a laser rangefinder with an accuracy of 0.5m at no less than 300m.				
126	HEL Optic	The HEL Optics must be color for daytime operation.				
127	HEL Optics Manual Focus	The HEL optics must allow manual focusing of the laser beam at a range of 60 to 500 m				

128	HEL Optics Automatic Focus	The HEL optics must allow automatic focusing of the laser beam from the rangefinder values, at a range of 60 to 500 m			
129	HEL Optics Pan and Tilt	The HEL optics must allow a -20 to +20 degree elevation and -30 to +30 degree azimuth range control			
130	HEL Optics Precision	The HEL optics must allow positioning the laser spot on target with a precision of no less than 10 μ rad.			
131	HEL Optics Vibration Shielding	The HEL optics must be properly shielded from vibrations inherent to the cooling and power generation systems so as to limit laser beam positioning fluctuations to be less than 3 mm at 300 m			