AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 7

2. AMENDMENT/MODIFICATION NO	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO	5. PROJECT NO. (If applicable)
0004	03/11/2011	REQ-4400-11-0004	

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than Item 6)	CODE
CONSUMER PRODUCT SAFETY COMMISSION DIV OF PROCUREMENT SERVICES 4330 EAST WEST HWY ROOM 517 BETHESDA MD 20814	EMPS		

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)		9A. AMENDMENT OF SOLICITATION NO
SEA LTD 7349 WORTHINGTON-GALENA RD COLUMBUS OH 43085-1519	(x)	
		9B. DATED (SEE ITEM 11)
	X	10A. MODIFICATION OF CONTRACT/ORDER NO. CPSC-S-10-0014
		10B. DATED (SEE ITEM 13) 02/23/2010
CODE [redacted]	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
0100A11DPS-2011-2263800000-EXHR004400-255C0 Net Increase: $86,950.00

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)
X	BILATERAL MODIFCATION, FAR 43.103 (a)

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

DUNS Number: [redacted]
Modification 0004 is hereby issued to contract CPSC-S-10-0014 to add further testing of recreational off-highway vehicles in accordance with the attached statement of work.

The total amount of this purchase order is herby increased by $86,950 from $247,969.00 to $334,919.00.

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED AND IN FULL FORCE AND EFFECT.

Add Item 0005 as follows:

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
GARY J. HEYDINGER DIRECTOR VEHICLE DYNAMICS		Kim Miles	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
Gary J. Heydinger (Signature of person authorized to sign)	3/17/11	(Signature of Contracting Officer)	3-17-11

NSN 7540-01-152-8070
Previous edition unusable

STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

NAME OF OFFEROR OR CONTRACTOR
SEA LTD

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
0005	Additional testing as required per the attached statement of work. To Include the following: $42,500 for autonmous rollover testing $21,000 for vehicle characteristic measurement of the Commander 1000 vehicle $22,000 for additional turn circle and J-turn test of two vehicles (Yamaha Rhino and Arctic Cat Prowler) $1,450 for transportation services	1	EA	86,950.00	86,950.00

Modification 4
Statement of Work
Vehicle Characteristics Measurement Service
For Recreational Off-Highway Vehicles (ROV)

A. Work

1. Static Measurements
The contractor shall provide measurements of vehicle characteristics, to include the following: the lateral, longitudinal, and vertical locations of the center of gravity (CG), weight distribution at each tire, roll mass moment of inertia, pitch mass moment of inertia, yaw mass moment of inertia, and roll/yaw mass product of inertia. Measurements shall be taken in selected load conditions (listed below) for the vehicle provided.

2. Static Test
The contractor shall also conduct tilt table testing of the vehicle in selected loading conditions (listed below) and report the minimum tilt angle at two wheel lift for the vehicle in each vehicle load condition and orientation. Tilt testing shall be done in two lateral orientations, one with the driver's side located to the high side of the tilted surface and one with the driver's side located to the low side of the tilted surface.

3. Dynamic Test
The contractor shall install instrumentation, conduct dynamic testing, and record data regarding certain dynamic performance characteristics of the supplied vehicle in each load condition. The characteristics to be evaluated will include vehicle lateral rollover propensity, steering under-steer gradient, and vehicle system resonant response to cyclic steering input.

4. Special Test Equipment
Contractor shall provide an outrigger suitable for use on a variety of recreational off-highway vehicles (ROV) that will provide a high level of safety during the conduct of rollover testing. The outrigger will be designed and installed to have a minimal affect on the vehicle characteristics to be studied. Measurements will be made to quantify the effects of the outrigger on the vehicle characteristics to be studied. The outrigger will be adaptable to all ROVs to be evaluated in the test program.

5. Report
Contractor shall reduce the data, plot significant events, analyze the data and prepare reports on the outcomes for the vehicle. Contractor shall provide the written report and data plots to CPSC within four weeks after each phase of the test program is completed. Data shall be retained for possible future reprocessing.

B. Objectives

1. To obtain vehicle characteristic data that is accurate and repeatable using measurement and test methods that are proven and accepted in the academic and

industrial communities. For CG location and mass moment of inertia values, one acceptable method of measurement is provided by the Vehicle Inertia Measurement Facility (VIMF).

2. To document, study, and compare the dynamic performance characteristics of commonly available ROVs.

C. Minimum Technical Requirements

C. 1. Static Measurements:
1. 1. Weight measurements shall be provided at each tire.
1. 2. Weight measurements shall be totaled for each axle and for the vehicle.
1. 3. Weight measurements shall be repeatable within $\pm$ 1 lb.
1. 4. Weight measurements shall be reported in pounds (lb.) and kilograms (kg).
1. 5. CG location measurements shall be repeatable within $\pm$ 0.5% of the measured values.
1. 6. The longitudinal, lateral, and height reference points for CG location shall be specified and shall follow conventions for reporting vehicle characteristics.
1. 7. CG locations shall be reported in inches (in.) and centimeters (cm).
1. 8. The pitch and yaw mass moment of inertia values shall be repeatable within $\pm$ 1% of the measured values.
1. 9. The roll mass moment of inertia values shall be repeatable within $\pm$ 2% of the measured values.
1. 10. The roll/yaw product of inertia shall be repeatable within $\pm$ 6.8kg-m^2.
1. 11. Mass moment of inertia values may be reported in kg-m^2, or slug-ft^2, or both.

C. 2. Static Test:
2. 1. The tilt table used for tilt testing shall deflect no more than 0.1 inch when loaded with the test vehicle.
2. 2. The tilt table used for tilt testing shall be flat within $\pm$ 0.1 inch.
2. 3. The tilt table used for tilt table testing shall have the capability to lift at a slow rate of 0.1 degree per second.
2. 4. Tilt test results shall be repeatable within $\pm$ 0.1 degree.
2. 5. Tilt test results shall be reported in angular degrees.

C. 3. Dynamic Test Data
3. 1. Record acceleration data in the longitudinal, lateral, and vertical directions at or near the CG location.
3. 2. Record steering input angle.
3. 3. Record suspension movement at each wheel location.
3. 4. Record vehicle speed.
3. 5. Record additional parameters as required to complete the static and dynamic test events.
3. 6. Record data during each test event at sufficient sample rates to examine short lived transient events.

C. 4. Dynamic Test Events
4. 1. J-Turns on an asphalt surface using drop throttle techniques and initiating steering at a set speed. Steering angles shall be incrementally increased such that the minimum lateral acceleration at the onset of rollover is encountered. Use a steering controller to achieve accurate steer angles and consistent steering rates.
4. 2. Constant radius turns on an asphalt surface using the methods of SAE J266 to plot steering gradient.
4. 3. Sinusoidal steering input and step steering input on an asphalt surface to evaluate vehicle system response.
4. 4. Asphalt test surfaces to have an overall slope of 1% or less.

C.5. Additional Dynamic Test Events with Two Supplied Vehicles
5.1. J-turns on an asphalt surface using drop throttle techniques and initiating 180 degrees of steering at a set speed of 20 mph. Use a steering controller to achieve accurate steer angles and consistent steering rates.
5.2 Constant steer turns on an asphalt surface at a set turn radius of 25 ft. Increase speed until vehicle limit is achieved and dynamic data is recorded.

C. 6. Remotely Controlled Vehicle
6.1. Contractor shall design and assemble the remote control (RC) facilities required for operation of vehicle steering, accelerator, and brake controls by an operator while that operator is not located onboard the vehicle.
6.2. Features for safe operation must be included in the RC system. A panic switch to release the accelerator and apply full brake pressure is recommended. An audible device to indicate when the vehicle is running is also recommended. Other safety features may be found to be necessary.
6.3. Procedures for safe test operations shall be developed and communicated to all members of the test team prior to the start of test operations.
6.4. Parts of the vehicle may be removed to allow for installation of the RC components except for seats, seat belts, ROPS, and occupant passive restraints. In general, the RC components must not interfere physically or functionally with the driver or passenger spaces so as to affect the objective of the tests.
6.5. At the completion of testing, the contractor shall restore the vehicle controls to the original, fully functional condition.
6.6. The RC facilities shall be transferable to all of the vehicles planned for the test series.

C.7. Remotely Controlled Vehicle Instrumentation
The contractor shall provide all the equipment necessary for the autonomous vehicle control and shall provide all equipment necessary to make measurements of vehicle motion during the tests.
7.1. Vehicle Instrumentation
1. Hand-wheel steering angle
2. Three axis (x, y, z) vehicle acceleration located near the vehicle center of gravity (CG)

3. Three axis (x, y, z) rotation angle sensors located near the vehicle CG

7.2. High Speed Video

1. Off board front view at rollover
2. Off board side view at rollover

7.2. Real Time Video

1. Off board overall view of rollover event

7.3. Additional data parameters may be included by the contractor as deemed necessary or useful.

C. 8. Remotely Controlled Vehicle Trials

In order to provide experience with conducting the tests and minimize damage to the test articles, a trial vehicle will be provided. Trial runs will be used to determine damage potential, vehicle speed requirements, steering angles, camera angles, on board instrumentation survivability, and data recording capability. The contractor shall incorporate learning from the trial runs into test procedures, test setup, camera placements, and course setup.

C. 9. Remotely Controlled Vehicle Testing

9.1. The contractor shall conduct test operations on a dirt or asphalt surface. It is recognized that damage to equipment is a possibility and therefore all steps necessary to minimize damage must be exercised.

9.2. The data collection test events will consist of left and right turning J-turns executed to produce 90 degree rollover events at or near the rollover threshold for each vehicle. One crash dummy shall be on board the vehicle for each event and shall be seated in the driver's seat for right hand turns and the passenger's seat for left hand turns.

9.3. Instrument data will be recorded continuously beginning just prior to initiating the turn and through completion of the rollover.

9.4. Video of each event will be recorded from the initiation of the turn through completion of the rollover. Off board high speed video will be situated to observe the movement of the crash dummy relative to fixed locations on the roll over protective structure (ROPS) of the vehicle.

9.5. A robotic steering controller may be used to control the steering rate and the steering angle during each event turn.

9.6. The contractor shall complete a minimum of three J-turns, with high quality instrument and high speed video data, in each direction for each vehicle.

9.7. The lead-in area of the test course to the event area must be as uniform and smooth as possible to minimize movement of the test dummies prior to the event.

9.8. The crash dummies used shall be 50th percentile male Hybrid III dummies.

D. Load Conditions

1. Curb weight plus driver and passenger load. Curb weight is defined as the weight of an unoccupied, unloaded vehicle with a full fuel load and all other fluids at the respective maximum level.
2. Curb weight plus test driver load and test instrumentation.
3. Each occupant load will be a Hybrid III 95th percentile male dummy or equivalent (213 lb.). For dynamic test, weight may be added in forms other than test dummies, to gain the best approximation to the specified load.
4. Dynamic tests will be conducted in curb weight plus test driver load and test instrumentation configuration only.

E. Vehicles To Be Evaluated

1. Bombardier Can-Am Commander 1000
2. Arctic Cat Prowler (Additional Dynamic Tests)
2. Yamaha Rhino (Additional Dynamic Tests and Remotely Controlled Vehicle Testing)

F. Shipping

1. Contractor is responsible for shipping vehicles from CPSC facility to test facility and return.