



## DCS Multi-terrain Maintenance Trolley AE Assessment Criteria

PEO-Maritime Undersea will assess design concepts provided in the White Papers based on the following requirements:

1 The Dry Combat Submersible (DCS) Multi-terrain Maintenance Trolley, will be able to act as a support or maintenance cradle in all modes. This includes access to all Glass-Reinforced Plastic (GRP) panels, hatches, covers and hull mounted equipment. The vendor shall use the accessibility provided by the Original Equipment Manufacturer (OEM) shop trolley as a guide to minimum accessibility.

2 The DCS Multi-terrain Maintenance Trolley must have stow-a-away steps to gain access to all areas of the DCS requiring access (e.g. into lower Lock-In, Lock-Out (LIO), jacking handles etc.). Ladders, steps or rungs will be provided to access all maintenance areas, topside and hatches.

3 The DCS Multi-terrain Maintenance Trolley will facilitate human access to the four (4) locations of the DCS Lithium Fault Tolerant (LiFT) battery areas. This access will allow a human to be able to physically reach the LiFT Battery pods and remove GRP panels and battery assemblies.

4 Additional access will be required through the DCS Multi-terrain Maintenance Trolley covering for defined maintenance, support and inspections.

5 The DCS Multi-terrain Maintenance Trolley must allow access for human ingress/egress to the Command Hatch and upper LIO. This may be accomplished through panels on the Mult terrain Maintenance Trolley.

6 The DCS Multi-terrain Maintenance Trolley arms shall be able to be manipulated to remove GRP while supporting the weight of the vehicle while stationary.

7 The DCS Multi-terrain Maintenance Trolley must meet current DCS weight requirements of 69000 lbs for DCS max dry weight plus a margin of +15%. (Ref Q8 ,10 & 24). Mass Properties (TBS).

8 Vendor shall procure and deliver Preventative Maintenance Cards, Operating Manual, drawings, and 3D model.

9 Drawings will list all parts associated with building the trolley to include, but not limited to soft goods, lubricants, torque values for fasteners.

10 Drawings to be delivered shall be Level III to include all sub drawings.

11 The DCS Multi-terrain Maintenance Trolley internal space, while the DCS is inside will have the temperature maintained to +80 and –50 degrees F. (This requirement still to be verified by offeror).



- 12 Securing mechanisms shall be fully integrated and hand operated.
- 13 No special tools shall be required to load, transport, unload or operate the Multi-terrain Maintenance Trolley.
- 14 The DCS Multi-terrain Maintenance Trolley must not exceed a maximum time limit of 1 hour to load or offload DCS to or from the Multi-terrain Maintenance Trolley.
- 15 The DCS Multi-terrain Maintenance Trolley must have the ability to load the submersible to and from the Multi-terrain Maintenance Trolley using common equipment that is available at the commercial and military locations (e.g. crane).
- 16 The DCS Multi-terrain Maintenance Trolley must not exceed a maximum time limit of 2 hours to load or offload from any of the defined conveyances (air, land, or sea).
- 17 The DCS Multi-terrain Maintenance Trolley must use materials and processes to operate for the intended seawater maritime environment.
- 18 The DCS Multi-terrain Maintenance Trolley shall be designed to operate for 20 years with minimal maintenance. A maintenance and support plan will be provided for approval by the Government.
- 19 Maintenance of the DCS Multi-terrain Maintenance Trolley must be in accordance with standard practices. It is expected that preventive and corrective maintenance will be accomplished by a Logistics Support Unit (LOGSU) or ship's force. Multi-terrain Maintenance Trolley will be delivered with a life-cycle sustainment plan that considers maintenance, spares, support equipment, qualification / training requirements.
- 20 The DCS Multi-terrain Maintenance Trolley must not have a single point failure of the drive or tire system that degrades performance. Contractor may provide a support plan that defines their approach if it includes replacement of parts while use to meet safe operation.
- 21 The DCS Multi-terrain Maintenance Trolley design must support covering the DCS such that it cannot be visually detected/classified while in transit, or in standby on the Multi-terrain Maintenance Trolley. This provision will both protect the DCS from environmental or other hazards and mask the DCS shape and presence/absence.
- 22 The DCS Multi-terrain Maintenance Trolley must have the ability to stow lifting equipment to support loading and offloading from the Multi-terrain Maintenance Trolley and water ingress and egress must be provided and attached/stored on board the Multi-terrain Maintenance Trolley. The objective requirement is that all support equipment required to load or unload the DCS from the Multi-terrain Maintenance Trolley and place/remove the DCS on cradles or to water are transported with the DCS in the Multi-terrain Maintenance Trolley. As an objective, the Multi-terrain Maintenance Trolley shall provide the capability to perform water launch from a suitable boat ramp to be determined by the contractor.





23 All additional support equipment will be carried in a separate container(s) that are not a part of this requirement set.

24 If additional support equipment is required for transport (pads, ramps, tie downs, etc.), this gear must be attached/stored on board the Multi-terrain Maintenance Trolley. SOFWERX 1925 E. 2nd Ave, Suite 102, Tampa, FL 33605 sofwerx.org

25 The DCS Multi-terrain Maintenance Trolley must have the ability to retain/capture fluids that may leak (oil, sea water, etc.). Volume estimated to be not greater than 50 Gallons. Ref Q4.

26 The DCS Multi-terrain Maintenance Trolley must be transportable by C-5 and C-17 aircraft. As an option the design should accommodate transportation on the aircraft with its mobility source (mule, truck or self-propelled. Must have the capability to be Air Transport Test Loading Activity (ATTLA) certified for transport, including all support equipment without DCS aboard.

27 The DCS Multi-terrain Maintenance Trolley must be able to load and unload from aircraft using common equipment that is routinely available at commercial and military airports. As an option, the Multi-terrain Maintenance Trolley shall be self-propelled.

28 The DCS Multi-terrain Maintenance Trolley must be able to be picked up with a single hook crane.

29 The DCS Multi-terrain Maintenance Trolley must be able to support side loading 3x the vehicle weight. Contractor may provide analysis showing that this requirement may be lowered based on their design assuring vehicle and personnel safety.

30 If self-propelled using internal combustion engine, must use diesel fuel and be able to accept offroad diesel, also must be acceptable to drive indoors. Contractor may propose alternate methods (e.g. electrical).

31 The DCS Multi-terrain Maintenance Trolley must be able to steer conventionally with a turn radius of 2x the length of the trolley, crab steer and circle steer with a turn radius of 1.5x the length of the trolley. As an objective the Multi-terrain Maintenance Trolley will be able to do an on-the-spot 360-degree turn.

32 The DCS Multi-terrain Maintenance Trolley must be able to automatically level itself to within 5 deg over uneven terrain. It is desired that the trolley shall have the ability to cant for and aft and port and starboard up to 10 deg.

33 The DCS Multi-terrain Maintenance Trolley must allow transport of the DCS in its operational configuration (batteries, gasses in flasks, coolant (NOTE: Assumes DCS removable bow planes ECP has been installed).

34 The DCS Multi-terrain Maintenance Trolley must have the ability to monitor critical DCS systems while loaded on the Multi-terrain Maintenance Trolley (current planning requires that





Multi-terrain Maintenance Trolley internal space temperature and LiFT battery pods require monitoring).

35 The DCS Multi-terrain Maintenance Trolley shall be able to maintain a transportation speed of at least 2.5 mph for 2 miles (single direction) when loaded with DCS with a continuous 5% grade.

36 The DCS Multi-terrain Maintenance Trolley shall be able to operate for at least 5 hours of continuous operation without refueling or replenishment.

37 The DCS Multi-terrain Maintenance Trolley shall be able to complete at least 4 sorties consisting of a single direction path of 2 miles and return to point of origin without replenishment.

38 The DCS Multi-terrain Maintenance Trolley must have the ability to roll over rugged terrain 3" or less without the tires getting locked/stopped by debris/rocks. It is desired that the Multi-terrain Maintenance Trolley shall be able to negotiate a 6" obstacle.

39 The DCS Multi-terrain Maintenance Trolley must meet Department of Transportation (DOT) requirements for turning radius, height, weight distribution, width, etc.

40 The DCS Multi-terrain Maintenance Trolley must be able to transport without a wide load permit.

41 The DCS Multi-terrain Maintenance Trolley must have all around drive lights with blackout switch.

42 The DCS Multi-terrain Maintenance Trolley must support transit without the DCS aboard on current and proposed Ships of Opportunity (SOO).



Some important notes:

1. Weights and CGs provided are the results of the in-air inclinings for DCS1 and DCS2. DCS3 has not performed an in-air inclining, so it's values are our best assessment.
2. The in-air inclining weights and CGs indicated below are for the base vehicle with gasses. Personnel, kit, variable ballast, and main ballast are not included in these numbers as they vary depending on the mission (with the exception of main ballast which is excluded because it is only used when DCS is submerged).
3. TCGs are along the vessel centerline.
4. CGs are given with reference to PC19 which is a point on the side of the LIO compartment which is a good approximation of it's geometric center. The actual reference point is projected inwards from PC19 to be on DCS' centerline.
5. VCG calculations are inherently prone to error due to the need to use trigonometric functions with small angles in which variations in measured angles yield substantial differences in calculated VCG. VCGs shown below should not be used for detailed calculations where high accuracy is needed. DCS3's VCG will be calculated when it does it's in-air inclining.

Hull	In-Air Weight (lbs)	VCG (mm)	LCG (mm)
1	63981.79	-688	-429.50
2	64169.60	-621	-523.00
3	63895.81	UNK	-429.80





For Reference the Government provides the following Attachments.

1 - DCS1-GA-00-01 V1-0 [DCS1 General Arrangement-Sheet 1-External]

2 - DCS Cradle Drawing

