DRAFT QRs OF HEAVY LIFT ROV

Ser No	QRs	
1.	**Weight and dimension**	
	(a)	The weight of the ROV excluding all accessories, Operational Control Unit & carrying case should be less than 600 Kg.
	(b)	The ROV should be equipped with all-terrain tyres with track options for climbing sidewalks, stairs, train tracks and rough terrain.
	(c)	ROV should be able to man oeuvre through door opening of min 36 inches.
2.	**Design Parameters**	
	Manipulator Assy	
	(a)	**Turret & Hydraulic Arm**
		(i) ROV should have turret mounted four joint angle articulated hydraulic dual arms capable of lifting minimum weight of 250Kg.
		(ii) ROV's should have two arms 1st Arm should have a reach of 2 meters or more and should be able to lift minimum 200Kg. 2nd Arm should have a reach of 1.2 meters or more should be able to lift minimum 50Kg.
		(iii) ROV should support minimum 300 Degrees of turret rotation should be able to drag/pull a car (LMV) in neutral gear on plain road.
		(iv) ROV's jaw should have high maneuverability with precision and should be able to pull out detonator and manipulate delicate objects.
		(v) Quad wheels and quick assembly system.
	(b)	**Claw Assembly**
		(i) It should have continuous claw rotation in both directions with a freedom of 15^0.
		(ii) It should be provided with attachment which can fit into the claw to able to cut, drag, carry, lift, twist, open & close objects
3.	**Performance Characteristics**	
	(a)	Should have min 6 wheel drive fitted with all terrain tyres with tracks to operate in Snow, Mud & Sand conditions.
	(b)	Should be capable of turning at its own position by skid steering.
	(c)	Should have drive system with a infinitely variable speed of 0-3kmph.
	(d)	Should be able to operate in all terrain conditions.
	(e)	Should be capable of operating for 4 hrs continuously with single set of rechargeable li-ion bty or better and also a spare bty set to be provided.
	(f)	Should have operating Temp : -20^oC to $+ 50^0C$ for ROV.

DRAFT QRs OF HEAVY LIFT ROV (Contd…)

Ser No	QRs	
4.	**Vision System must comply with min IP 65 Certificate standards**	
	(a)	ROV should have
		(i) One high resolution PTZ camera (PTZ Camera fusion day and thermal technology camera having PAN (0 degree-360 degree), tilt (min 145 degree to 45 degree) & min 10 x optical zoom.
		(ii) 4 high resolution fixed cameras with IR illuminate with min range of 50m.
		(iii) One x 3D Camera with min 5 mtrs of viewing distance.
		(iv) Synchronized movement and unlimited pre-programmed positions.
		(v) Distance sensors.
		(vi) LED lighting for clear illuminating in the front min 5m area ahead.
	(b)	ROV should perform following
		(i) Carry Water disruptors & fire it attached.
		(ii) Carry X-rays.
		(iii) It should have Sensors for CBRN and explosive detection.
		(iv) It should have Sample holder.
		(v) It should be able to lift round, flat, sharp edged, rectangular or any irregular shape objects with a strong grip.
		(vi) Claw should open min 20cm.
		(vii) Shotgun cradle.
		(viii) Multiple tools (drill, cutter, gripping etc).
		(ix) Barrel claws.
		(x) Parallel gripper with pressure sensor.
		(xi) Automatic optical fiber reel.
5.	**Payloads**	
	(a)	Should have min one recoilless water jet disruptor mounted on its hydraulic arm with a capability to fire at a min distance of 3mtrs.
	(b)	It should have mount for wpn (as specified by the user).
	(c)	Should have laser aiming device for firing the wpn & water jet disruptor accurately.
6.	**Operational Control Unit**	
	(a)	It should be man portable OCU in a ruggedized case with min IP rating 54 with bi-directional audio -video data connectivity system with ROV.
	(b)	Should have sunlight readable display screen of min 15” Full HD 1080 P (1920 x 1080) or more.

DRAFT QRs OF HEAVY LIFT ROV (Contd…)

Ser No		QRs
	(c)	The control of the ROV should be possible using joysticks or Game Pad and should also have membrame keypad or optional touch screen facility for control function.
	(d)	Should have a provision to mount on a wheeled adjustable tripod for ease of operator.
	(e)	Should have min 1TB storage capacity for data.
	(f)	It should have an arrangement for powering the unit either from its own rechargeable bty or from an external power supply.
	(g)	Should able to perform continuous operation of min 4 hrs with a single set of rechargeable bty with one spare set of bty to be provided.
	(h)	It should have in built safety features to prevent misuse by unauthorized personnel.
	(j)	It should have facility for accidental firing safety.
	(k)	Should have AC power charger of CE standard 2015 or above with facility to extend the length of the charger for min 15 mtrs.
	(l)	Should have computer interface which allows the system to be upgraded without changing the hardware.
	(m)	Should have facility to configure the system to control the ROV of same type.
	(n)	Should have operating temp : -20°C to +50°C.
7.	**Comn**	
	(a)	Bi-directional wireless data communication between the Control Station and ROV.
	(b)	ROV should have wireless COFDM mesh operational range of >1km line-of-sight and >300m in Urban (NLOS) environment for communicating and controlling ROV from operators console. It should be provided with COFDM mesh repeater Operators Console should be in a safe transport box. Console should have minimum 15” screen to view four cameras selected from control panel from the console. Should have minimum storage capability of 500gb. Should have Ergonomic gamepad for controlling movement functions of ROV.
	(c)	Bi-directional fiber optic and tethered communication cable data communication range of up to 300 meters between the Control Station and ROV. Rollable mast minimum 5 mtr should be provided with base station.
	(d)	It should have two way Intercom/broad cast system between ROV & OCU using headset & microphone which should have a sensitive microphone to pickup acoustic signature.

DRAFT QRs OF HEAVY LIFT ROV (Contd…)

Ser No	QRs	
8.	**Firing System**	
	(a)	Secured trigger system.
	(b)	Wpn mounted Cameras for firing having IR capability for min range of 5 mtrs.
	(c)	Claw Camera having IR capability for min range of 5 mtrs.
	(d)	360^0 (day & Thermal Imaging) Camera on ROV to provide stitched or unstitched panoramic view on control station.
9.	**Misc**	
	(a)	The equipment should be provided with the following :-
		(i) Special Maintenance Tools.
		(ii) Cleaning Kit.
		(iii) Min repair list of spares
		(iv) Technical documents.
		(v) Illustrated spare parts list.
	(b)	Technical specifications including inspection criteria.
	(c)	Technical manual giving full description of equipment.
	(d)	User Handbook.
	(e)	Specifications for Packing/handling/transportation/storage.
	(f)	One tripod to be provided for placing the Control Station.
	(g)	Ruggedised and waterproof container for ROV and Control Station.

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV

Ser No	QRs		Trial Directives
1.	**Weight and dimension**		
	(a)	The weight of the ROV excluding all accessories, Operational Control Unit & carrying case should be less than 600 Kg.	BOO to physically check the weight on a weighing scale.
	(b)	The ROV should be equipped with all-terrain tyres with track options for climbing sidewalks, stairs, train tracks and rough terrain.	BOO to physically check the ROV under various outdoor conditions :- (a) Sidewalk. (b) Road bumps. (c) Grass surface. (d) Train tracks. (e) Stairs. (f) Uphill Slope with rough terrain. (g) Downhill Slope.
	(c)	ROV should be able to manoeuvre through door opening of min 36 inches.	BOO to physically check by moving the ROV through opening of min 36 inches.
2.	**Design Parameters**		
	Manipulator Assy		
	(a)	**Turret & Hydraulic Arm**	
		(i) ROV should have turret mounted four joint angle articulated hydraulic dual arms capable of lifting minimum weight of 250Kg.	To be checked physically by BOO.
		(ii) ROV's should have two arms 1st Arm should have a reach of 2 meters or more and should be able to lift minimum 200Kg. 2nd Arm should have a reach of 1.2 meters or more should be able to lift minimum 50Kg.	BOO to physically measure the maximum reach and the lift capacity at the fully extended range of the hydraulic arm of the ROV.

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV

Ser No	QRs	Trial Directives
	(iii) ROV should support minimum 300 Degrees of turret rotation should be able to drag/pull a car (LMV) in neutral gear on plain road.	To be checked physically by the BOO.
	(iv) ROV's jaw should have high maneuverability with precision and should be able to pull out detonator and manipulate delicate objects.	To be checked physically by the BOO as follows :- (a) Test if ROV can perform precision maneuverability. (b) Test if ROV can pull out detonator. (c) Test if ROV can manipulate delicate objects.
	(v) Quad wheels and quick assembly system.	To be checked physically by the BOO.
	(b) **Claw Assembly**	
	(i) It should have continuous claw rotation in both directions with a freedom of 15^0.	To be checked physically by the BOO.
	(ii) It should be provided with attachment which can fit into the claw to able to cut, drag, carry, lift, twist, open & close objects	To be checked physically by the BOO.

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV (Contd..)

Ser No		QRs	Trial Directives
3.	**Performance Characteristics**		
	(a)	Should have min 6 wheel drive fitted with all terrain tyres with tracks to operate in Snow, Mud & Sand conditions.	BOO to physically check the ROV under various outdoor conditions :- (a) Sidewalk. (b) Road bumps. (c) Grass surface. (d) Train tracks. (e) Stairs. (f) Uphill Slope with rough terrain. (g) Downhill Slope.
	(b)	Should be capable of turning at its own position by skid steering.	
	(c)	Should have drive system with a infinitely variable speed of 0-3kmph.	
	(d)	Should be able to operate in all terrain conditions.	
	(e)	Should be capable of operating for 4 hrs continuously with single set of rechargeable li-ion bty or better and also a spare bty set to be provided.	
	(f)	Should have operating Temp : -20°C to + 50^{0}C for ROV.	National / international accredited lab certificate to be provided by vendor.
4.	**Vision System must comply with min IP 65 Certificate standards**		
	(a)	ROV should have	To be checked physically by the BOO.
		(i) One high resolution PTZ camera (PTZ Camera fusion day and thermal technology camera having PAN (0 degree-360 degree), tilt (min 145 degree to 45 degree) & min 10 x optical zoom.	
		(ii) 4 high resolution fixed cameras with IR illuminate with min range of 50m.	

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV (Contd..)

Ser No	QRs			Trial Directives
		(iii)	One x 3D Camera with min 5 mtrs of viewing distance.	To be checked physically by BOO.
		(iv)	Synchronized movement and unlimited pre-programmed positions.	
		(v)	Distance sensors.	
		(vi)	LED lighting for clear illuminating in the front min 5m area ahead.	
	(b)	ROV should perform following		To be checked physically by BOO. For Ser No 4 (b) (iii) the list of CBRN agents and explosives detected to be provided.
		(i)	Carry Water disruptors & fire it attached.	
		(ii)	Carry X-rays.	
		(iii)	It should have Sensors for CBRN and explosive detection.	
		(iv)	It should have Sample holder.	
		(v)	It should be able to lift round, flat, sharp edged, rectangular or any irregular shape objects with a strong grip.	
		(vi)	Claw should open min 20cm.	
		(vii)	Shotgun cradle.	
		(viii)	Multiple tools (drill, cutter, gripping etc).	
		(ix)	Barrel claws.	
		(x)	Parallel gripper with pressure sensor.	
		(xi)	Automatic optical fiber reel.	

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV (Contd..)

Ser No		QRs	Trial Directives
5.	**Payloads**		
	(a)	Should have min one recoilless water jet disruptor mounted on its hydraulic arm with a capability to fire at a min distance of 3mtrs.	To be checked physically by BOO.
	(b)	It should have mount for wpn (as specified by the user).	To be checked physically by BOO.
	(c)	Should have laser aiming device for firing the wpn & water jet disruptor accurately.	To be checked physically by BOO.
6.	**Operational Control Unit**		
	(a)	It should be man portable OCU in a ruggedized case with min IP rating 54 with bi-directional audio -video data connectivity system with ROV.	To be checked physically by BOO.
	(b)	Should have sunlight readable display screen of min 15” Full HD 1080 P (1920 x 1080) or more.	To be checked physically by BOO.
	(c)	The control of the ROV should be possible using joysticks or Game Pad and should also have membrame keypad or optional touch screen facility for control function.	To be checked physically by BOO.
	(d)	Should have a provision to mount on a wheeled adjustable tripod for ease of operator.	To be checked physically by BOO.
	(e)	Should have min 1TB storage capacity for data.	To be checked physically by BOO.
	(f)	It should have an arrangement for powering the unit either from its own rechargeable bty or from an external power supply.	To be checked physically by BOO.
	(g)	Should able to perform continuous operation of min 4 hrs with a single set of rechargeable bty with one spare set of bty to be provided.	To be checked physically by BOO.

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV (Contd..)

Ser No		QRs	Trial Directives
	(h)	It should have in built safety features to prevent misuse by unauthorized personnel.	To be checked physically by BOO.
	(j)	It should have facility for accidental firing safety.	To be checked physically by BOO.
	(k)	Should have AC power charger of CE standard 2015 or above with facility to extend the length of the charger for min 15 mtrs.	To be checked physically by BOO.
	(l)	Should have computer interface which allows the system to be upgraded without changing the hardware.	To be checked physically by BOO.
	(m)	Should have facility to configure the system to control the ROV of same type.	To be checked physically by BOO.
	(n)	Should have operating temp : -20°C to +50°C.	To be checked physically by BOO.
7.	**Comn**		
	(a)	Bi-directional wireless data communication between the Control Station and ROV.	Compliance certificate to be provided by OEM and also to be physically checked by BOO.
	(b)	ROV should have wireless COFDM mesh operational range of >1km line-of-sight and >300m in Urban (NLOS) environment for communicating and controlling ROV from operators console. It should be provided with COFDM mesh repeater Operators Console should be in a safe transport box. Console should have minimum 15” screen to view four cameras selected from control panel from the console. Should have minimum storage capability of 500gb. Should have Ergonomic gamepad for controlling movement functions of ROV.	To be checked physically by BOO.

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV (Contd..)

Ser No		QRs	Trial Directives
	(c)	Bi-directional fiber optic and tethered communication cable data communication range of up to 300 meters between the Control Station and ROV. Rollable mast minimum 5 mtr should be provided with base station.	BOO to physically check the ROV using fiber optic and tethered communication and verify operational distance.
	(d)	It should have two way Intercom/broad cast system between ROV & OCU using headset & microphone which should have a sensitive microphone to pickup acoustic signature.	To be checked physically by BOO.
8.	**Firing System**		
	(a)	Secured trigger system.	To be checked physically by BOO.
	(b)	Wpn mounted Cameras for firing having IR capability for min range of 5 mtrs.	To be checked physically by BOO.
	(c)	Claw Camera having IR capability for min range of 5 mtrs.	To be checked physically by BOO.
	(d)	360^0 (day & Thermal Imaging) Camera on ROV to provide stitched or unstitched panoramic view on control station.	To be checked physically by BOO.

DRAFT TRIAL DIRECTIVES FOR HEAVY LIFT ROV (Contd..)

Ser No	QRs			Trial Directives
9.	**Misc**			
	(a)	The equipment should be provided with the following :-		To be checked physically by BOO.
		(i)	Special Maintenance Tools.	To be checked physically by BOO.
		(ii)	Cleaning Kit.	To be checked physically by BOO.
		(iii)	Min repair list of spares	To be checked physically by BOO.
		(iv)	Technical documents.	To be checked physically by BOO.
		(v)	Illustrated spare parts list.	To be checked physically by BOO.
	(b)	Technical specifications including inspection criteria.		To be checked physically by BOO.
	(c)	Technical manual giving full description of equipment.		To be checked physically by BOO.
	(d)	User Handbook.		To be checked physically by BOO.
	(e)	Specifications for Packing/handling/transportation/storage.		To be checked physically by BOO.
	(f)	One tripod to be provided for placing the Control Station.		To be checked physically by BOO.
	(g)	Ruggedised and waterproof container for ROV and Control Station.		To be checked physically by BOO.