Requirements Traceability and Verification Matrix (RTVM) for the Medium Range Radar System

Appendix A5 to the MRR Acquisition SOW

Verification Methods			
Method	**Definition**	**OPI**	**DND Witness**
Analysis	Engineering Analysis based on measurements, statistical data, simulation or mathematical model.	Contractor	No
Test	Formal physical testing with accepted industry standards. Procedures must be well documented.	Contractor	Optional (at Canada's discretion)
Inspection	Inspection purpose, methods and procedures must be well documented so result can be duplicated using the same inspection procedures. Only visual inspection is not acceptable.	Contractor	Optional (at Canada's discretion)
Demonstration	A comphrehensive demonstration and/or application of the functions and features of the system or its components.	Contractor	Yes
Infer from FA	No action needed except by request of the TA or any changes to the production item from First Article (FA) or production methods.	Contractor	No

Paragraph Number	SPS Paragraph from the RFP	Requirement Type	First Article Verification Method	Production Article Verification Method
Fit For Use - MRR System	Where there is no specific requirement in the specifications and notwithstanding the verifications outlined below, any conditions that will render the MRR System unfit for the use for which it was intended shall be deemed as system failure.	Direction		
1	**INTRODUCTION**	Title		
1.1	**Purpose**	Title		
1.1.1	This System Performance Specification describes the key performance requirements for a Medium Range Radar (MRR); referred to henceforth as the “MRR System”, for the Land Force Intelligence Surveillance, Target Acquisition and Reconnaissance (LF-ISTAR) support for the force generation and deployment of Canadian Armed Forces (CAF) units.	Description		
1.2	**Identification / Overview**	Title		
1.2.1	The Medium Range Radar (MRR) System specified in this document includes the sensor system and the other ancillary equipment. A complete system consisting of all the equipment required such as Canadian communication equipment will be specifically referenced as applicable.	Direction		
2	**APPLICABLE DOCUMENTS**	Title		
2.1	General. A complete list of documents that form part of this specification to the extent specified herein, and are supportive of the specification when referenced in section 3 and beyond can be found in Annex D (Applicable Documents) to the MRR System RFP.	Direction		
3	**Requirements**	Title		
3.1	**System Performance**	Title		
3.1.1	**General System Capability**	Title		
3.1.1.1	**Radar Modes**	Title		
3.1.1.1.1-1	The MRR System shall have the necessary capacity to simultaneously host software for all modes.	Shall	Demonstration	Infer from first article
3.1.1.1.1-2	Simultaneous hosting shall enable the system to switch between weapon locating and air surveillance modes without rebooting the system.	Shall	Demonstration	Infer from first article
3.1.1.1.2	The MRR System should perform the weapon locating mission and the air surveillance mission concurrently.	Should	Demonstration	Infer from first article
3.1.1.2	**System Integration, Transmit and Record Data.**	Title		
3.1.1.2.1	The MRR System shall digitally record and transmit target data.	Shall	Test	Infer from first article
3.1.1.3	**Command Post Equipment.**	Title		
3.1.1.3.1	The ruggedized equipment/workstation that would be installed in a command post to operate the radar shall be provided in transit cases in accordance with IP 65, IEC 60529.	Shall	Inspection	Infer from first article
3.1.1.4	**Remote Operation.**	Title		
3.1.1.4.1	The MRR System shall have a remote operation capability allowing the operator to be a minimum distance of 100 meters from the MRR System.	Shall	Test	Infer from first article
3.1.1.5	**Into and Out of Action Time.**	Title		
3.1.1.5.1	The set-up time is defined as the amount of time required to have the MRR system deployed and in action from a road move configuration.	Description		
3.1.1.5.2	Set-up times do not include set-up of communication masts / antennae, camouflage, additional grounding beyond the minimum safe grounding, cable payout due to a remote location for the power generator, manual survey in the case of INS failure, automatic terrain following initialization after the system start-up, manual levelling if the automatic levelling has failed, installation of the DTED files, installation of communication devices beyond the operators workstation.	Description		
3.1.1.5.3-1	Set-up times make the assumption that the soil is suitable for the easy installation of safe grounding for the MRR System operation.	Condition		
3.1.1.5.3-2	Set up time also includes all activities required for the safe operation of the MRR System in the operational environmental conditions as defined in paragraphs 3.3.10 and 3.3.11 Wind and Sand Dust.	Condition		
3.1.1.5.4	The MRR System shall be set-up and operational in no more than 20 minutes in temperatures from 5°C to 49°C.	Shall	Demonstration	Infer from first article
3.1.1.5.5	The MRR System shall be set-up and operational in no more than 30 minutes in temperatures from -40°C to 5°C.	Shall	Demonstration	Infer from first article

3.1.1.5.6-1	For temperatures from -15 degrees C to 49 degrees C, the MRR System shall be packed up and out of action in no longer than 5 minutes (displacement time).	Shall	Demonstration	Infer from first article
3.1.1.5.6-2	Displacement time starts when the system is powered off and ends when the system is ready for movement.	Description		
3.1.1.5.6-3	The times to remove and stow communication masts / antennae, camouflage, additional grounding beyond the minimum safe grounding, cable payout due to a remote location for the power generator, and manual levelling if the automatic levelling has failed, are excluded from the displacement time.	Condition		
3.1.1.5.7	Setup and pack-up times of the MRR System shall be achievable with no more than four persons.	Shall	Demonstration	Infer from first article
3.1.2	**General Weapon Locating Capability.**	Title		
3.1.2.1	Mode. The MRR System shall have stand-by (non-radiating but ready to radiate on command) and operating (radiating) modes.	Shall	Demonstration	Infer from first article
3.1.2.2	Extrapolation. The MRR System shall automatically extrapolate the trajectory of a projectile to the correct location of the weapon and to the correct altitude of the weapon within the accuracy limits of the Location Accuracy paragraph 3.1.3.6 as determined by Digital Terrain and Elevation Data (DTED).	Shall	Demonstration	Infer from first article
3.1.2.3	Automatic Altitude Correction. The MRR System shall automatically correct for differences in altitude between the MRR System and the location of the weapon using DTED.	Shall	Demonstration	Infer from first article
3.1.2.4	Minimum Radial Velocity. The minimum radial velocity of a projectile, with respect to the position of the MRR System, from a weapon that can be located, shall be automatically adaptive to the clutter conditions.	Shall	Test	Infer from first article
3.1.2.5	**Target Location Capacity**	Title		
3.1.2.5.1	The MRR System shall acquire, process, record and transmit to an external destination a minimum of 40 targets per minute.	Shall	Analysis	Infer from first article
3.1.2.5.2	The MRR System shall record and store target records to internal storage devices.	Shall	Demonstration	Infer from first article
3.1.2.5.3	The amount of internal recording capability shall be 24 hrs.	Shall	Inspection	Infer from first article
3.1.2.5.4	All applicable recorded data shall be accessible through a USB interface.	Shall	Test	Infer from first article
3.1.2.6	**Site Reconnaissance Survey and Navigation**	Title		
3.1.2.6.1	The MRR System shall have an automated navigation system providing accurate pointing/orientation data.	Shall	Test	Infer from first article
3.1.2.6.2	The navigation system of the MRR System shall operate with or without access to military GPS signals.	Shall	Demonstration	infer from first article
3.1.2.6.3	The MRR System shall manually accept external position information in the absence of GPS signals.	Shall	Demonstration	Infer from first article
3.1.2.6.4	The MRR System shall manually accept orientation information.	Shall	Demonstration	Infer from first article
3.1.2.7	**Weapon Locating Man Machine Interface**	Title		
3.1.2.7.1	As a minimum the MRR System shall display the following:	Header		
3.1.2.7.1.a	Ground tracks of the projectile;	Shall	Demonstration	Infer from first article
3.1.2.7.1.b	Point of Origin (POO);	Shall	Demonstration	Infer from first article
3.1.2.7.1.c	Point of Impact (POI);	Shall	Demonstration	Infer from first article
3.1.2.7.1.d	Radar position;	Shall	Demonstration	Infer from first article
3.1.2.7.1.e	Table with projectile details;	Shall	Demonstration	Infer from first article
3.1.2.7.1.f	Individual detections of the projectile;	Shall	Demonstration	Infer from first article
3.1.2.7.1.g	BIT;	Shall	Demonstration	Infer from first article
3.1.2.7.1.h	Jamming strobe indicator;	Shall	Demonstration	Infer from first article
3.1.2.7.1.i	Ground tracks of other non-ballistic tracks (the detections of other objects/clutter is not suppressed);	Shall	Demonstration	Infer from first article
3.1.2.7.1.j	An error estimation in ellipse format of the POO;	Shall	Demonstration	Infer from first article
3.1.2.7.1.k	An error estimate in ellipse format of the POI; and	Shall	Demonstration	Infer from first article
3.1.2.7.1.l	A tool to show the view-shed information (shows terrain viewable by the radar in 3 dimensions).	Shall	Demonstration	Infer from first article
3.1.2.7.2	As a minimum the MRR System display shall have the following controls:	Header		
3.1.2.7.2.a	Zone creation capability;	Shall	Demonstration	Infer from first article
3.1.2.7.2.b	Frequency selection;	Shall	Demonstration	Infer from first article
3.1.2.7.2.c	Map controls;	Shall	Demonstration	Infer from first article
3.1.2.7.2.d	Communication controls (to be refined with interface to CAF C2)	Shall	Demonstration	Infer from first article
3.1.2.7.2.e	Radiation control;	Shall	Demonstration	Infer from first article
3.1.2.7.2.f	Mission planning tools;	Shall	Demonstration	Infer from first article

3.1.2.7.2.g	Sector radiation control; and	Shall	Demonstration	Infer from first article
3.1.2.7.2.h	Control of the applicable color codes on the display screen.	Shall	Demonstration	Infer from first article
3.1.3	**Hostile Weapon Locating Capability.**	Title		
3.1.3.1	**Search Sector Capability.**	Title		
3.1.3.1.1	The MRR System in the 360 degree weapon location mode shall continuously search and locate in a full 360 degree sector in azimuth.	Shall	Analysis	Infer from first article
3.1.3.1.2	The MRR System should search and locate in a 90 degree sector in azimuth, to obtain better location accuracy and longer range capability.	Should	Analysis	Infer from first article
3.1.3.2	**Location Range**	Title		
3.1.3.2.1	The MRR System shall locate mortar, gun, and rocket weapon systems positioned anywhere out to a mandatory range of 15 km from the MRR System's location, in a 360 degree sector in azimuth.	Shall	Test	Test
3.1.3.2.2	In a 360 degree sector in azimuth, the minimum location range for mortars and guns shall be 5 km or less.	Shall	Test	Test
3.1.3.2.3	In a 360 degree sector in azimuth, the minimum location range for rockets shall be 8 km or less.	Shall	Test	Test
3.1.3.2.4	The MRR System shall determine the Point of Impact (POI) for projectiles which land within 15 km radius of the MRR System when the firing weapon is up to 15km from the MRR System.	Shall	Test	Test
3.1.3.2.5	The MRR System should be able to locate guns and rockets to a range greater than 15 km in a 360 degree sector in azimuth.	Should	Test	Infer from first article
3.1.3.2.6	The MRR System should be able to locate guns and rockets to a range greater than 15 km in a 90 degree sector in azimuth.	Should	Test	Infer from first article
3.1.3.3	**Minimum Calibre.**	Title		
3.1.3.3.1	The minimum calibre mortar weapon that the MRR System shall locate is 60mm.	Shall	Test	infer from first article
3.1.3.3.2	The minimum calibre gun weapon that the MRR System shall locate is 105 mm.	Shall	Test	Infer from first article
3.1.3.3.3	The minimum calibre rocket weapon that the MRR System shall locate is 107 mm.	Shall	Test	Infer from first article
3.1.3.4	**Weapon Types.**	Title		
3.1.3.4.1	At a minimum, the weapon systems that shall be located by the MRR System are in the following table:	Shall	Test	Infer from first article
Ref	See Weapon Types in MRR ACQ SPS, Table in Para 3.1.3.4.1	Direction		
3.1.3.5	**False Location Rate (Weapon Locating).**	Title		
3.1.3.5.1	The MRR System shall have a maximum False Location Rate (FLR) of one (1) false location reported per six (6) hour period under nominal environmental conditions with terrain clutter and 4 mm/hour rainfall. The clutter model for terrain clutter and 4 mm/hour rainfall is specified at paragraph 3.5.12 of this document.	Shall	Test	Infer from first article
3.1.3.6	**Location Accuracy.**	Title		
3.1.3.6.1	The MRR System shall have an accuracy of location for mortars equal to or better than a Circular Error Probable of 50% CEP(50%) of 50 meters or 0.5% of range from the MRR System while locating in a 360-degree sector in azimuth.	Shall	Test	Test
3.1.3.6.2	The MRR System shall have an accuracy of location for guns (105mm and larger) and rockets (107mm and 122mm) equal to or better than a CEP(50%) of 75 meters or 1.0% of range from the MRR System while locating in a 360-degree sector in azimuth.	Shall	Test	Test
3.1.3.6.3-1	The MRR System should locate mortars and guns out to a range of 15 km or more in a pre-defined azimuth sector of 90 degrees, with a minimum accuracy of CEP(50%) of 50 m or 0.5% of range.	Should	Test	Infer from first article
3.1.3.6.3-2	The minimum location range for mortars in this predefined sector should be no more than 1 km.	Should	Test	Infer from first article
3.1.3.6.3-3	The minimum location range for guns in this predefined sector should be no more than 3 km.	Should	Test	Infer from first article
3.1.3.6.4.1	The MRR System should locate rockets out to a range of 15 km or more in a predefined azimuth sector of 90 degrees, with a minimum accuracy of CEP(50%) of 60m or 1.0% of range.	Should	Test	Infer from first article
3.1.3.6.4-2	The minimum location range for rockets in this predefined sector should be no more than 5 km.	Should	Test	Infer from first article
3.1.3.6.5-1	The MRR System should locate mortars and guns out to a range of 15 km or more in 360 degree mode, with a minimum accuracy of CEP(50%) of 50 m or 0.5% of range	Should	Test	Infer from first article
3.1.3.6.5-2	The minimum location range for mortars in 360 degree mode should be no more than 1 km.	Should	Test	Infer from first article
3.1.3.6.5-3	The minimum location range for guns in 360 degree mode should be no more than 3 km.	Should	Test	Infer from first article
3.1.3.6.6-1	The MRR System should locate rockets out to a range of 15 km or more in 360 degree mode with a minimum accuracy of CEP(50%) of 60m or 1.0% of range.	Should	Test	Infer from first article
3.1.3.6.6-2	The minimum location range for rockets in 360 degree mode should be no more than 5 km.	Should	Test	Infer from first article
3.1.3.7	**Probability of Location**	Title		
3.1.3.7.1	The probability of location for mortars, guns and rockets shall be a minimum of 80%.	Shall	Test	Infer from first article
3.1.3.8	**Specific Location Accuracy of Guns**	Title		
3.1.3.8	The MRR System while operating in a 360 degree mode shall locate a 105mm gun with 85% probability of location and 150m Circular Error Probable of 50% (CEP(50%)) when:	Shall	Test	Infer from first article
3.1.3.8.a	firing at a 15 km range from the MRR System;	Condition		
3.1.3.8.b	the direction from the MRR System that the gun is firing from, is not known a priori;	Condition		
3.1.3.8.c	the weapon is fired towards the MRR System with aspect angles of: 0°, +40°, -40°;	Condition		

3.1.3.8.d	the gun is firing a minimum of 1,100 mils elevation;	Condition		
3.1.3.8.e	the gun round is not base bleed;	Condition		
3.1.3.8.f	the impact location is not known a priori and may be anywhere along the described ground path but at least 6 km from the gun and no further than 15 km from the MRR System; and	Condition		
3.1.3.8.g	the projectile is 30 mil above the terrain mask for at least 6 seconds.	Condition		
3.1.3.9	**Specific Location Accuracy of Rockets**	Title		
3.1.3.9	The MRR System while operating in a 360 degree mode shall locate a 107mm rocket launcher with 85% probability of location and 150m CEP(50%) when:	Shall	Test	Infer from first article
3.1.3.9.a	firing at a 15 km range from the MRR System;	Condition		
3.1.3.9.b	the direction from the MRR System that the rocket is firing from, is not known a priori;	Condition		
3.1.3.9.c	the weapon is fired towards the MRR System with aspect angles of: 0°, +40°, -40°;	Condition		
3.1.3.9.d	the rocket is firing a minimum of 600 mils elevation;	Condition		
3.1.3.9.e	the impact location is not known a priori and may be anywhere along the described ground path but at least 6 km from the weapon and no further than 15 km from the MRR System; and	Condition		
3.1.3.9.f	the projectile is 30 mil above the terrain mask for at least 6 seconds.	Condition		
3.1.3.10	**Specific Location Accuracy of Mortars**	Title		
3.1.3.10	The MRR System while operating in a 360 degree mode shall locate an 81mm mortar with 85% probability of location and 75m CEP(50%) when:	Shall	Test	Infer from first article
3.1.3.10.a	firing at a 15 km range from the MRR System;	Condition		
3.1.3.10.b	the direction from the MRR System that the mortar is firing from, is not known a priori;	Condition		
3.1.3.10.c	the weapon is fired towards the MRR System with aspect angles of: 0°, +40°, -40°;	Condition		
3.1.3.10.d	the mortar is firing at 1,400 mils elevation and reaches a height of at least 800m;	Condition		
3.1.3.10.e	the impact location is not known a priori and may be anywhere along the described ground path inside the 15 km radius from the MRR System; and	Condition		
3.1.3.10.f	the projectile is 30 mil above the terrain mask for at least 6 seconds.	Condition		
3.1.3.11	**Volley Fire.**	Title		
3.1.3.11.1	The MRR System shall locate volley fire from mortars and guns within the essential CEP limits in the Location Accuracy paragraph 3.1.3.6 of this document, from at least 5 or more different weapons, in a 360 degree sector in azimuth, at a maximum of 15 km from the MRR System.	Shall	Test	Infer from first article
3.1.3.12	**Hostile Impact Prediction.**	Title		
3.1.3.12.1	The MRR System shall predict the impact point of a located hostile projectile to within 500m, CEP (50%) when the projectile impact point remains inside the 360°, 15 km distance from the MRR System.	Shall	Test	Test
3.1.3.12.2	The MRR System shall predict the impact point of a located hostile projectile if it lands outside the 360°, 15 km distance from the MRR System.	Shall	Test	Test
3.1.3.12.3	The MRR System should predict the impact point of a located hostile projectile to less than 500m, CEP(50%) when the projectile remains inside the 360°, 15 km distance from the MRR System.	Should	Test	Infer from first article
3.1.3.12.4	The point of impact or the point of origin for any detected and tracked hostile projectile which is outside the specified range shall be recorded if there are a series of detections considered to be a non-ambiguous valid trajectory track for that projectile.	Shall	Analysis	Infer from first article
3.1.3.13	**Ballistic/Non-Ballistic Delivery System Classification.**	Title		
3.1.3.13.1	The MRR System shall be able to classify each located weapon, either as a mortar, gun or rocket.	Shall	Test	Infer from first article
3.1.3.13.2	The MRR System shall be able to classify ballistic and non-ballistic projectiles.	Shall	Test	Infer from first article
3.1.4	**Friendly Fire Locating Capability.**	Title		
3.1.4.1	**Friendly Fire Registration.**	Title		
3.1.4.1.1	The MRR System shall perform friendly fire registration missions with a CEP(50%) of 50 meters or 0.5% of range or better out to a range of 15 km.	Shall	Test	Infer from first article
3.1.4.1.2	The MRR System should perform friendly fire registration missions with a CEP(50%) of 50 meters or 0.5% of range or better out to a range of up to 30 km in a predefined azimuth sector of 90 degrees.	Should	Test	Infer from first article
3.1.5	**Air Surveillance Capability**	Title		
3.1.5.1	General. The MRR System shall have an airspace surveillance mission, 360 degrees in azimuth. The clutter model at paragraph 3.5.12 of this document shall apply.	Shall	Analysis	Infer from first article
3.1.5.2	**Range for 1m^2 Targets.**	Title		
3.1.5.2.1-1	The MRR System shall detect and track a 1 meter^2 RCS uncooperative target at a range from 1 km to 75 km.	Shall	Test	Infer from first article
3.1.5.2.1-2	A one m² target consists of either fixed wing high speed aircraft or low speed rotary wing aircraft in clutter.	Description		
3.1.5.2.2	The MRR System should detect and track a 1 meter² RCS uncooperative target at a range from 1 km to distances greater than 75 km.	Should	Test	Infer from first article
3.1.5.3	**Range for 0.1m^2 Targets.**	Title		
3.1.5.3.1-1	The MRR System shall detect and track a 0.1 meter^2 RCS uncooperative target at a minimum range from 1 km to 25 km.	Shall	Test	Infer from first article
3.1.5.3.1-2	Aircraft with 0.1 m² RCS may consist of high speed cruise missiles and low speed UAVs in ground clutter.	Description		
3.1.5.3.2	The MRR System should detect and track a 0.1 meter^2 RCS uncooperative target at a minimum range from 1 km to distances greater than 25 km.	Should	Test	Infer from first article
3.1.5.4	Altitude. The MRR System shall detect uncooperative targets at altitudes from 100 meters or less to 10,000 meters or more.	Shall	Test	Infer from first article
3.1.5.5	**Elevation.**	Title		
3.1.5.5.1-1	The MRR System shall detect uncooperative targets from -10 degrees to a minimum of 30 degrees in elevation in search.	Shall	Analysis	Infer from first article

3.1.5.5.1-2	The minimum elevation angle of -10°is subject to a terrain imposed limit, such that it is applicable to sites where the local topology and MRR system position supports a Line of Sight (LOS) to targets below the nominal horizon beyond the minimum detection range of the radar.	Description		
3.1.5.5.2	The MRR System shall track uncooperative targets from -10 degrees to a minimum of 45 degrees in elevation.	Shall	Analysis	Infer from first article
3.1.5.6	Accuracy. The MRR System shall have a one-sigma accuracy for 1 meter2 RCS targets of 20 meters in range, 0.6 degrees in azimuth and 600 meters in altitude at a range of 75 km.	Shall	Analysis	Infer from first article
3.1.5.7	Target Characteristics. The fluctuation of the radar cross-section of airborne targets is expected to best be modeled by a Swerling I type target. See P.Swerling, Probability of Detection for Fluctuating Targets, Rand Research Memo RM-1217, 17 March 1954.	Description		
3.1.5.7.1	The MRR System shall detect fixed wing high speed aircraft and cruise missiles to a maximum velocity of 825 m/sec or more.	Shall	Analysis	Infer from first article
3.1.5.7.2	The MRR System shall detect UAV and rotary aircraft to a minimum velocity of 20 m/sec or less.	Shall	Test	Infer from first article
3.1.5.8	Detection in Rainfall. The MRR System shall have a minimum probability of detection of 50% per scan in rain fall of 4mm per hour at the maximum range specified in Paragraph 3.1.5.2.1 and Paragraph 3.1.5.3.1. Refer to the clutter model at paragraph 3.5.12.	Shall	Analysis	Infer from first article
3.1.5.9	Detection in Clear Weather. The MRR System shall have a minimum probability of detection of 80% per scan in clear weather at the maximum range (specified in Paragraph 3.1.5.2.1 and Paragraph 3.1.5.3.1) with a minimum of 24 detection opportunities per target per minute. In clear weather, the ground clutter model at paragraph 3.5.12 in this document still applies.	Shall	Test	Infer from first article
3.1.5.10	**Detection Rate.**	Title		
3.1.5.10.1	The MRR System shall have a minimum possible detection rate of 24 detections per target per minute, which assumes one detection per target per antenna rotation.	Shall	Test	Infer from first article
3.1.5.10.2	The probability of detection of 80% in clear conditions at maximum range results in 19.2 detections per target per minute. Similarly, the probability of detection of 50% in rain results in 12 detections per target per minute.	Description		
3.1.5.10.3	The MRR System should have a detection rate of over 24 detections per target per minute.	Should	Test	Infer from first article
3.1.5.11-1	Air Surveillance False Track Rate. The MRR System shall have a maximum false track rate of 20 false tracks per hour.	Shall	Analysis	Infer from first article
3.1.5.11-2	See definition of False Track Rate in Acronyms and Definitions, Annex E.	Description		
3.1.5.12	**New Track Latency.**	Title		
3.1.5.12.1	The MRR System shall establish a track in 10 seconds or less following the first detection of a target with a 90% probability of track initiation.	Shall	Test	Infer from first article
3.1.5.12.2	The MRR System should establish a track in less than 10 seconds following the first detection of a target with a 90% probability of track initiation.	Should	Test	Infer from first article
3.1.5.13	**Tracking.**	Title		
3.1.5.13.1	The MRR System shall be able to keep track of a minimum of 200 tracks simultaneously.	Shall	Analysis	Infer from first article
3.1.5.14	Classification of Targets. The MRR System shall be able to classify the following targets:	Header		
3.1.5.14.a	Fixed wing aircraft	Shall	Analysis	Infer from first article
3.1.5.14.b	Hovering rotary wing aircraft	Shall	Analysis	Infer from first article
3.1.5.14.c	Moving rotary wing aircraft	Shall	Analysis	Infer from first article
3.1.5.14.d	UAVs	Shall	Analysis	Infer from first article
3.1.5.14.e	Cruise missiles	Shall	Analysis	Infer from first article
3.1.5.14.f	Airborne jammers	Shall	Analysis	Infer from first article
3.1.5.14.g	Ground based jammers.	Shall	Analysis	Infer from first article
3.1.5.15	**Identification Friend or Foe (IFF) / Secondary Surveillance Radar (SSR).**	Title		
3.1.5.15.1	The MRR System shall have an IFF interrogator that as a minimum has modes 1, 2, 3/A, 4, C, S and is “mode 5 ready” and contains all of the latest features of a modern IFF / secondary surveillance radar (SSR) suitable for use with the specified function of the air surveillance radar specified herein.	Shall	Inspection	Infer from first article
3.1.5.15.2	The IFF interrogator in modes that require crypto shall be operable with at least one of the following crypto devices:	Header		
3.1.5.15.2.a	KIV-77;	Shall	Inspection	Infer from first article
3.1.5.15.2.b	KIV-78;	Shall	Inspection	Infer from first article
3.1.5.15.2.c	Embedded cypto in accordance with US DoD AIMS 04-900A; or	Shall	Inspection	Infer from first article
3.1.5.15.2.d	Other US NSA or NATO Security and Evaluation Agency (SECAN) approved mode 4/5 cryptographic device.	Shall	Inspection	Infer from first article
3.1.5.15.3	The IFF/SSR shall have a minimum target report load of 200 airborne targets per scan.	Shall	Analysis	Infer from first article
3.1.5.15.4	The primary surveillance radar (PSR) to IFF/SSR correlation percentage shall be a minimum of 98%.	Shall	Analysis	Infer from first article
3.1.5.15.5-1	The IFF/SSR shall be compliant with US DOD AIMS 03-1000, ICAO Annex 10, and STANAG 4193.	Shall	Inspection	Infer from first article
3.1.5.15.5-2	The Mode S capabilities shall be limited to the Mode S selective interrogation feature.	Shall	Inspection	Infer from first article

3.1.5.15.6	The IFF/SSR shall have a Selective Identification Feature (SIF).	Shall	Inspection	Infer from first article
3.1.5.16	**Air Surveillance Man Machine Interface / Display Presentation.**	Title		
3.1.5.16.1	Controls. The MRR System shall have a Primary Surveillance Radar (PSR) RF inhibit function in all azimuth and selectable by specific sectors. The MRR System shall have a Secondary Surveillance Radar (SSR) RF inhibit function in all azimuth and selectable by specific sectors.	Shall	Test	Infer from first article
3.1.5.16.2	**Air Surveillance Display Presentation.**	Title		
3.1.5.16.2.1	The MRR System display shall show correlated returns from the Primary Surveillance Radar and the Secondary Surveillance Radar.	Shall	Demonstration	Infer from first article
3.1.5.16.2.2	The MRR System display shall show sources of active RF interference from a Jam Strobe function.	Shall	Analysis	Infer from first article
3.1.5.16.2.3	The MRR System display shall have data blocks with the minimum data consisting of the transponder mode, the IFF/SSR altitude, the PSR altitude, the PSR range and the PSR bearing. The data block may also contain a target identification number that refers to a table with the same data.	Shall	Demonstration	Infer from first article
3.1.5.16.2.4	The MRR System display shall have a “hooked” capability that will follow an airborne target with a data block.	Shall	Demonstration	Infer from first article
3.1.5.16.2.5	The MRR System display shall have the capability of displaying the range and bearing between any two points chosen by the operator.	Shall	Demonstration	Infer from first article
3.1.5.16.2.6	The MRR System display shall have the capability to zoom in on a portion of the display or to offset/pan the display.	Shall	Demonstration	Infer from first article
3.1.5.16.2.7	The MRR System display shall have the capability to allow the operator to map points of interest and zones onto the background map.	Shall	Demonstration	Infer from first article
3.1.5.16.2.8	The MRR System display shall display emergency beacons, urgency modes, safety related alerts and warnings received from aircraft IFF transponders.	Shall	Demonstration	Infer from first article
3.1.5.16.2.9	The MRR System display shall have the capability to display maps.	Shall	Demonstration	Infer from first article
3.1.5.16.2.10	The MRR System display presentation shall be clear and concise, and continuously updated in a manner that precludes erroneous identification or confusion on the part of the operator.	Shall	Inspection	Infer from first article
3.1.5.16.2.11	The MRR System display shall present to the operator the following additional information:	Header		
3.1.5.16.2.11.a	Distinct symbols for unintentional duplicated SSR codes and aircraft identification;	Shall	Inspection	Infer from first article
3.1.5.16.2.11.b	Predicted positions for non updated track;	Shall	Analysis	Infer from first article
3.1.5.16.2.11.c	Display the reserved SSR codes including 7500, 7600 and 7700 operation of IDENT and display the SSR code 1000 used as a non discrete code for ADS-B use as well as other uses in Canada and the USA;	Shall	Inspection	Infer from first article
3.1.5.16.2.11.d	Bearing to the airborne target;	Shall	Demonstration	Infer from first article
3.1.5.16.2.11.e	Range to the airborne target;	Shall	Demonstration	Infer from first article
3.1.5.16.2.11.f	Absolute Altitude, height above terrain of the airborne target;	Shall	Demonstration	Infer from first article
3.1.5.16.2.12.g	True Altitude, height above mean sea level of the airborne target;	Shall	Demonstration	Infer from first article
3.1.5.16.2.12.h	The operator’s choice of UTM or MGRS grid reference or Latitude and Longitude of the airborne target;	Shall	Demonstration	Infer from first article
3.1.5.16.2.11.i	Individual position blips such as PSR, SSR symbols and combined symbols;	Shall	Demonstration	Infer from first article
3.1.5.16.2.11.j	SSR responses which include SSR code of the aircraft, aircraft identity and pressure altitude derived level information;	Shall	Demonstration	Infer from first article
3.1.5.16.2.11.k	Plot and track data (historical); and	Shall	Demonstration	Infer from first article
3.1.5.16.2.11.l	The operator’s choice of imperial or metric measurements where applicable.	Shall	Demonstration	Infer from first article
3.1.5.17	**Air Surveillance Modes**	Title		
3.1.5.17.1	A second air surveillance mode may be used to meet the hovering helicopter requirement for the air surveillance capability.	Choice	Demonstration	Infer from first article
3.1.6	**External Communication Interfaces**	Title		
3.1.6.1	The air surveillance part of the MRR System shall be integrated using the ASTERIX standard interface protocol by EUROCONTROL.	Shall	Test	Infer from first article
3.1.6.2-1	The weapon locating part of the MRR System shall use a non-proprietary Application Programming Interface.	Shall	Inspection	Infer from first article
3.1.6.2-2	The weapon locating part of the MRR shall transmit a comprehensive set of messages to the LCSS.	Shall	Test	Infer from first article
3.1.6.3	The communication link between the MRR operator’s station and the Canadian Armed Forces Land Command Support System (LCSS) shall be based on Ethernet technology, capable of a minimum 100Base-T.	Shall	Test	Infer from first article
3.2	**Electronic Protection Measures.**	Title		
3.2.1	**General.**	Title		
3.2.1.1	The MRR System shall have Emissions Control (EMCON) capabilities.	Shall	Analysis	Infer from first article
3.2.1.2	In a non-interference environment, electronic protection (EP) features shall not degrade the MRR System performance.	Shall	Analysis	Infer from first article
3.2.1.3	All MRR system equipment shall incorporate all necessary Electronic Protection Measures (EPM) which allows it to operate in an interference environment.	Shall	Analysis	Infer from first article

3.2.1.4	The MRR System shall use modes and techniques which allow the radar to operate in an environment with sources of both intentional and unintentional RF interference.	Shall	Analysis	Infer from first article
3.2.1.5	The MRR System shall incorporate operating modes and techniques which allow the radar to minimize RF interference to other systems.	Shall	Analysis	Infer from first article
3.2.2	Threat Environment. The expected MRR System electronic threat consists of friendly emissions, stand-off jammers, expendable jammers, repeat jammers in the side-lobes and chaff.	Description		
3.2.3	Degradation. In the presence of a broadband jammer covering the entire operational band of the MRR System with an effective radiated power (ERP) of 25 W/MHz, located at 15 km from the radar, performance of the radar in both range and accuracy shall not be degraded by more than 20% over the azimuth search sector except within ± five (5) degrees of the jammer's azimuth or in the immediate proximity (range gates/Doppler cells) of a chaff cloud.	Shall	Analysis	Infer from first article
3.2.4-1	False Track Rate. The MRR System's average per scan False Track Rate in the Air Surveillance Mode shall not be degraded by more than 20% in an interference environment as defined by the broad band jammer in paragraph 3.2.3.	Shall	Analysis	Infer from first article
3.2.4-2	See definition of False Track Rate in Acronyms and Definitions, Annex E.	Description		
3.2.5	Chaff. The MRR System shall incorporate electronic protection measures to minimize detection performance degradation when a target is in the vicinity of a chaff cloud.	Shall	Analysis	Infer from first article
3.2.5.1	The nominal characteristics of the chaff cloud are:	Description		
3.2.5.1.a	Chaff radar cross section within resolution cell of the radar: 10 m^2;	Condition		
3.2.5.1.b	Wind speed (average speed of chaff cloud): 20 m/sec;	Condition		
3.2.5.1.c	Velocity distribution of cloud: Gaussian;	Condition		
3.2.5.1.d	Altitude distribution: 0 to 6,000 m;	Condition		
3.2.5.1.e	Range distribution: 10 to 80 nm; and	Condition		
3.2.5.1.f	Single cloud diameter on release: 30 m.	Condition		
3.3	**Environmental.**	Title		
3.3.1	All MRR System components required to operate the system remotely shall be IP65 certified.	Shall	Inspection	Infer from first article
3.3.2	**Temperature.**	Title		
3.3.2.1	All MRR System external components shall operate in accordance with the specifications herein in temperatures between -40 degrees C and +49 degrees C.	Shall	Test	Infer from first article
3.3.2.2	All MRR System components shall survive storage in temperatures from -46 degrees C to + 63 degrees C.	Shall	Test	Infer from first article
3.3.2.3	The low temperature operational test shall be in accordance with MIL-STD-810G, Method 502.5, Procedure II (operation) for -40 degrees C temperature or -25 degrees C temperature as applicable.	Shall	Test	Infer from first article
3.3.2.4	The high temperature storage test shall be in accordance with MIL-STD-810G, Method 501.5, Procedure I (storage) using the cyclic temperatures in Table 501.5-II High Temperature Cycles, Climatic Category - Basic Hot, for a maximum temperature exposure of +63 degrees C and the MRR System is in a transport configuration.	Shall	Test	Infer from first article
3.3.2.5	The low temperature storage test shall be in accordance with MIL-STD-810G, Method 502.5, Procedure I (storage) for a -46 degrees C temperature for 8 hours and the MRR System is in a transport configuration.	Shall	Test	Infer from first article
3.3.3	**Solar Radiation.**	Title		
3.3.3.1	The MRR System shall operate in accordance with the specifications herein with solar radiation of 1120 W/square meter at the maximum required operation temperature.	Shall	Analysis	Infer from first article
3.3.3.2	The solar radiation test shall be in accordance with MIL-STD-810G, Method 505.5, Procedure I (cycling - heating effects) using the cyclic temperatures in Figure 505.5-1 Procedure I - Cycling Test, for a maximum temperature of 49 degrees C and a maximum solar radiation of 1120 W/square meter.	Shall	Analysis	Infer from first article
3.3.4	**Humidity.**	Title		
3.3.4.1	The MRR System shall operate in accordance with the specifications herein at humidity levels of 95% RH at a temperature of 27 degrees C.	Shall	Test	Infer from first article
3.3.4.2	The humidity test shall be in accordance with MIL-STD-810G, Method 507.5, Procedure II using a minimum of ten 24 hour humidity cycles as per Figure 507.5-7 Aggravated Temperature-Humidity Cycle.	Shall	Test	Infer from first article
3.3.5	**Fungus.**	Title		
3.3.5.2	The materials which make up the MRR System shall be fungus resistant and shall not support the growth of fungus.	Shall	Analysis	Infer from first article
3.3.5.3-1	The fungus test shall be in accordance with MIL-STD-810G, Method 508.6.	Shall	Test	Infer from first article
3.3.5.3-2	The fungus test shall be done using representative materials or coupons rather than testing the full MRR system.	Shall	Test	Infer from first article
3.3.6	**Precipitation.**	Title		
3.3.6.1	The MRR System shall be able to withstand rainfall of 45 mm/hr for extended periods without damage due to water penetration.	Shall	Analysis	Infer from first article
3.3.6.2	The MRR System shall be able to withstand the effects of blowing rain without water penetration except where the design allows for water penetration without damage as part of normal operations as follows; 45mm/hr rainfall rate; 9 m/s wind speed.	Shall	Analysis	Infer from first article
3.3.6.3	The operational, non-operational and transport configuration rain test shall be in accordance with MIL-STD-810G, Method 506.5, Procedure I, using 45 mm/hr as the rainfall rate and 9 m/s as the wind speed.	Shall	Test	Infer from first article
3.3.7	**Freezing Rain and Icing.**	Title		
3.3.7.1	The MRR System shall survive exposure to freezing rain conditions found in MIL HDBK 310. Manual removal of ice prior to operation is permitted.	Shall	Analysis	Infer from first article
3.3.7.2	The MRR System shall be resistant to damage from reasonable and normal ice removal procedures.	Shall	Analysis	Infer from first article
3.3.7.3	The MRR System shall be able to withstand build up of glaze ice, specific gravity of 0.9, up to 50 mm thick due to icing or freezing rain.	Shall	Analysis	Infer from first article

3.3.7.4	The MRR System shall be able to withstand the build up of hard rime ice, specific gravity of 0.6, up to 75 mm thick due to icing or freezing rain.	Shall	Analysis	Infer from first article
3.3.7.5	The MRR System shall be able to withstand the build up of soft rime ice, specific gravity of 0.2, up to 150 mm thick due to icing or freezing rain.	Shall	Analysis	Infer from first article
3.3.8	**Snow Loading.**	Title		
3.3.8.1	The MRR System shall be able to withstand the snow load of 100 kg/square meter.	Shall	Analysis	Infer from first article
3.3.8.2	For the snow loading specification, verification shall be done by analysis.	Shall	Analysis	Infer from first article
3.3.9	**Altitude.**	Title		
3.3.9.1	The MRR System shall operate in accordance with the specifications herein at altitudes of up to 10,000 feet above sea level.	Shall	Analysis	Infer from first article
3.3.9.2	The MRR System shall be able to withstand storage at altitudes of 15,000 feet.	Shall	Analysis	Infer from first article
3.3.9.3	The operational altitude test shall be in accordance with MIL-STD-810G, Method 500.5, Procedure II, using the equivalent air pressure found at 10,000 feet.	Shall	Test	Infer from first article
3.3.9.4	The storage altitude test shall be in accordance with MIL-STD-810G, Method 500.5, Procedure I, using the equivalent air pressure found at 15,000 feet.	Shall	Test	Infer from first article
3.3.10	**Wind.**	Title		
3.3.10.1	The MRR System shall be able to operate in accordance with the specifications herein in winds of 20m/s with the antenna deployed.	Shall	Analysis	Infer from first article
3.3.10.2	The MRR System shall be able to withstand winds of 29m/s while in any non operating configuration including with the antenna in a deployed position.	Shall	Analysis	Infer from first article
3.3.10.3	With antenna stowed the MRR System shall survive winds of 40 m/s.	Shall	Analysis	Infer from first article
3.3.10.4	For the wind specification, verification shall be done by analysis.	Direction	Analysis	Infer from first article
3.3.11	**Sand and Dust.**	Title		
3.3.11.1	The MRR System shall operate during and survive exposure to blowing sand and dust.	Shall	Analysis	Infer from first article
3.3.11.2	The MRR System shall use air filters or filtering systems or sand and dust removal systems for all air inlets into the system to combat the effects of sand and dust.	Shall	Inspection	Infer from first article
3.3.11.3	Air filter systems or sand and dust removal systems shall withstand daily removal, cleaning or filter replacement without damage.	Shall	Demonstration	Infer from first article
3.3.11.4	The MRR System shall employ seals for all bearings and sliding surfaces.	Shall	Inspection	Infer from first article
3.3.11.5	The MRR System shall deploy and operate as specified in a sand concentration of 1.0 g/m3 with wind speeds of up to 18 m/s.	Shall	Analysis	Infer from first article
3.3.11.6	The MRR System shall deploy and operate as specified in a dust concentration of 1.0 g/m3 with wind speeds of up to 1.5 m/s.	Shall	Analysis	Infer from first article
3.3.11.7	The dust test while in operation shall be in accordance with MIL-STD-810G, Method 510.5, Procedure I, using a wind speed of 1.5 m/s and a dust concentration of 1.0 g/cubic meter.	Shall	Analysis	Infer from first article
3.3.11.8	For the sand specification, verification shall be done by analysis. If testing has been done previously, the record of the test with a third party can be used as proof of compliance. Use MIL-STD-810G, Method 510.5, Procedure II, using a wind speed of 18 m/s and a sand concentration of 1.0 g/cubic meter.	Direction	Analysis	Infer from first article
3.3.12	**Shock.**	Title		
3.3.12.1	The MRR System shall withstand shocks due to transportation by rail with a maximum impact speed of 12.9 km/hr.	Shall	Test	Infer from first article
3.3.12.2	For the shock specification, the MRR System is in a transport configuration and the test specification shall be in accordance with MIL-STD-810G, Method 526 Rail Impact. Loaded cars may be used with prior approval of the Technical Authority. A test railcar, equipped with chain tie-downs and end-of-car cushioned draft gear are to be used unless other railcar types are approved by the Technical Authority. Substitute test items are not be used unless approved by the Technical Authority.	Shall	Test	Infer from first article
3.3.13	**Vibration.**	Title		
3.3.13.1	The MRR System shall withstand the vibration caused by highway and cross-country transportation, in accordance with MIL-STD-810G, Method 514.6, Procedure III; Category 6 of Annex C, in a transport configuration.	Shall	Test	Infer from first article
3.3.13.2	The road test shall consist of 300 km paved surface at a minimum speed of 80 km/hr, 64 km of secondary gravel roads at 45 km/hr, 15 km of trails at 15 km /hr, 6 km cross country at 10 km /hr, 0.5 km of driving on Belgian block at a maximum speed of 10 km /hr and 0.5 km of driving on 6 inch washboard at a maximum speed of 10 km/hr.	Shall	Test	Infer from first article
3.3.14	**Salt Fog and Corrosion Resistance**	Title		
3.3.14.1	The MRR System shall be resistant to the corrosive effects of exposure to road salt or salt fog while being transported either by road or sea.	Shall	Analysis	Infer from first article
3.3.14.2	For the salt fog specification, the exterior of the MRR System is in a transport configuration and the test specification shall be in accordance with MIL-STD-810G, Method 509.5.	Shall	Analysis	Infer from first article
3.3.15	**Temperature Shock**	Title		
3.3.15.1	The MRR System shall not be physically damaged or suffer a deterioration in performance after being exposed to temperature shock such as may be experienced when the MRR System is moved from a heated storage area when the outside temperature is at the minimum operating temperature.	Shall	Test	Infer from first article
3.3.15.2	For the temperature shock test, the MRR System shall be in a transport configuration and the test specification shall be in accordance with MIL-STD-810G, Method 503.5, Procedure I-D from room temperature to minimum operating temperature.	Shall	Test	Infer from first article
3.4	**Mobility**	Title		
3.4.1	**General**	Title		
3.4.1.1-1	The MRR Sensor System shall be mounted on a single trailer.	Shall	Inspection	Inspection

3.4.1.1-2	Ancillary equipment may be transported on the GFE prime mover or a second trailer.	Choice	Test	Infer from first article
3.4.1.2	The trailer(s) shall be supplied by the contractor and is part of the MRR System.	Shall	Inspection	Inspection
3.4.1.3-1	The trailer(s) shall be towed by Canadian in-service vehicles. Canadian in-service vehicles are equipped with pintle hooks for towing.	Shall	Inspection	Inspection
3.4.1.3-2	The lunette height shall be adjustable.	Shall	Inspection	Inspection
3.4.1.3-3	The lunette shall measure 76.2 mm x 41.2 mm.	Shall	Inspection	Inspection
3.4.1.3-4	The vehicle maximum vertical load of the pintle hook shall be 2250 kg.	Shall	Test	Infer from first article
3.4.1.4	The gross vehicle weight of any trailer fully equipped shall not exceed 13,500kg.	Shall	Test	Test
3.4.1.5	The trailer(s) shall meet the required standards as set out by Transport Canada in the Motor Vehicle Safety Regulations at the transport Canada web site www.tc.gc.ca.	Shall	Inspection	Inspection
3.4.1.6	The trailer(s) brakes shall be power assisted.	Shall	Inspection	Inspection
3.4.1.7	The trailer(s) shall have an emergency brake and a parking brake.	Shall	Inspection	Inspection
3.4.1.8	The receptacle for the trailer electrical connector shall be in accordance with STANAG 4007.	Shall	Inspection	Inspection
3.4.1.9	Trailer(s) shall be designed such that the MRR System meets the reliability specifications.	Shall	Analysis	Infer from first article
3.4.1.10	The trailer(s) shall be equipped with a suspension system of sufficient capacity to absorb the high impact loading experienced when traveling over rough terrain.	Shall	Test	Infer from first article
3.4.1.11	High frequency vibrations and noise shall be attenuated by the suspension system to minimize the detrimental effects on the payload.	Shall	Test	Infer from first article
3.4.1.12	Standard Military Pattern (SMP) blackout lights shall be provided in accordance with STANAG 4381.	Shall	Inspection	Inspection
3.4.1.13	The MRR System shall operate when emplaced in any orientation on slopes of up to 5 degrees without excavation.	Shall	Test	Infer from first article
3.4.2	**Transportability and Deployability.**	Title		
3.4.2.1	The location of the Centre of Gravity (CG) of the fully loaded trailer in all three axes shall be determined and printed on the trailer nameplate.	Shall	Inspection	Infer from first article
3.4.2.2-1	The trailer shall have a landing gear with a pad or suitable device to prevent undue sinking of the front end in moderately soft soil.	Shall	Inspection	Infer from first article
3.4.2.2-2	The pressure exerted on the soil shall be no greater than 28 pounds per square inch (psi).	Shall	Test	Infer from first article
3.4.2.3	The trailer landing gear shall either be fully retractable or fold towards the trailer when the trailer is hooked to a prime mover.	Shall	Inspection	Inspection
3.4.2.4	The trailer wheels and tires shall be interchangeable from one side to the other and front to rear, if applicable.	Shall	Inspection	Inspection
3.4.2.5	The trailer shall have a spare wheel with tire.	Shall	Inspection	Inspection
3.4.2.5-2	Changing tools shall be provided in a locked compartment.	Shall	Inspection	Inspection
3.4.2.5-3	Tools in the locked compartment shall be required to remove the spare tire from its storage position.	Shall	Inspection	Inspection
3.4.2.6	Gladhand air hose connectors shall be provided at the front of the trailer.	Shall	Inspection	Inspection
3.4.2.7	Stowage for wheel chocks (4) and a single steel plate 40 cm by 40 cm by 6 mm shall be provided either in a securable container or space.	Shall	Inspection	Inspection
3.4.2.8	Provision for mounting a rear license plate shall be provided.	Shall	Inspection	Infer from first article
3.4.2.9-1	The trailer Mean Kilometres Between Mission Failures (MKBMF) shall not be less than 16,000 km,	Shall	Analysis	Infer from first article
3.4.2.9-2	See Para 3.5.7.5 for Mission Failure definition.	Description		
3.4.3	**Strategic Mobility.**	Title		
3.4.3.1	The MRR System, on trailers, shall be transportable by a C-17 Globemaster III aircraft.	Shall	Analysis	Infer from first article
3.4.3.2-1	The MRR System shall be lifted by crane or fork lift using standard lifting frames, straps, shackles, and spreaders bars.	Shall	Analysis	Inspection
3.4.3.2-1	Any specialized equipment required shall be supplied by the contractor.	Shall	Inspection	Inspection
3.4.3.3	All transport configurations or assemblies shall have sufficient slinging and tie-down points that meet the requirements of MIL-STD-209K.	Shall	Analysis	Inspection
3.4.3.4	Suitable tie-down points shall be provided so that the trailer, with full payload (MRR System), may be lifted or tied down for transport by rail, air or sea.	Shall	Analysis	Inspection
3.4.3.5	The lifting and tie-down points of the MRR System shall meet the strength requirements of STANAG 4062.	Shall	Analysis	Infer from first article
3.4.4	**Rail Transportability.**	Title		
3.4.4.1	The MRR System, on trailers, shall meet the requirement for unrestricted rail transportation using the Gabarit International de Chargement (GIC) loading gauge from MIL-STD 1366.	Shall	Analysis	Infer from first article
3.4.5	**Air Transportability.**	Title		
3.4.5.1	The MRR System shall survive pressures and pressure changes associated with air transportation.	Shall	Analysis	Infer from first article
3.4.6	Sea Transportability. The MRR System shall be transportable by sea.	Shall	Analysis	Infer from first article
3.4.7	**Highway Operation.**	Title		
3.4.7.1	The MRR System shall be towed at a speed of up to 90 km/hr on highways in good condition under all climatic conditions.	Shall	Test	Infer from first article
3.4.8	**Tactical Mobility.**	Title		
3.4.8.1	The MRR System shall be towed up slopes of up to 40% on a hard surface.	Shall	Test	Infer from first article
3.4.8.2	The MRR System shall be towed down slopes of up to 40% on a hard surface.	Shall	Test	Infer from first article
3.4.8.3	The MRR System shall be towed while traversing slopes of up to 20% on a hard surface.	Shall	Test	Infer from first article

3.4.8.4-1	The addition of the MRR System onto the contractor selected trailer shall not affect the centre of gravity of the trailer sufficiently to cause the trailer to become unstable.	Shall	Test	Infer from first article
3.4.8.5	The primary trailer brake system shall be able to stop, hold, and control the trailer ascent and descent on a 20% grade.	Shall	Test	Infer from first article
3.4.8.6	The parking brake shall hold the trailer on a 20% grade facing up or down the grade.	Shall	Test	Infer from first article
3.4.8.4-2	The trailer shall not sway at highway speeds.	Shall	Test	Infer from first article
3.4.8.4-3	The stability of the trailer shall be tested using the steady state circular and double lane change tests per NATO Allied Vehicle Testing Publication AVTP-1, publication # 03-160W – Dynamic Stability.	Shall	Test	Infer from first article
3.4.8.7	The trailer shall be driven through light vegetation and of being backed into wood lines of light vegetation without damaging any exterior component. Light vegetation is defined as small trees/brush with a stem diameter less than or equal to 25 mm in diameter at breast height.	Shall	Inspection	Infer from first article
3.4.8.8	The ground clearance shall be the maximum possible but not less than 350 mm.	Shall	Inspection	Infer from first article
3.4.8.9-1	The trailer angle of departure shall not be less than 30 degrees.	Shall	Inspection	Infer from first article
3.4.8.9-2	A retractable under ride bumper may be used to meet this requirement.	Choice	Test	Infer from first article
3.4.8.10	The MRR System shall be able to ford a water obstacle up to 750mm deep.	Shall	Test	Infer from first article
3.5	**Miscellaneous Specifications.**	Title		
3.5.1	**Electrical Power.**	Title		
3.5.1.1	The electrical power source shall be part of the MRR System.	Shall	Inspection	Inspection
3.5.1.2	The electrical power source shall be a state of the art, mature technology, of conservative and proven design with a proven high reliability.	Shall	Analysis	Infer from first article
3.5.1.3	The generator engine shall be a state of the art, mature technology, of conservative and proven design with a proven high reliability.	Shall	Analysis	Infer from first article
3.5.1.4	The MRR System shall permit connection to an external independent power source of adequate power capacity that matches the generator voltage and frequency.	Shall	Inspection	Inspection
3.5.1.5	The MRR System generator shall be a multi-fuel system that uses the fuel as required by STANAG 4362.	Shall	Test	Infer from first article
3.5.1.6	The connector to the outside source shall allow the direct connection of an appropriate cable onto CSA approved connectors.	Shall	Inspection	Inspection
3.5.1.7	The generator audio signature shall not exceed 70 dBA at 7 meters.	Shall	Test	Infer from first article
3.5.1.8	The fuel tank on the generator shall be of sufficient size to run the generator for 8 hours at full power without refuelling.	Shall	Analysis	Infer from first article
3.5.2	Cables. All portable cables that are part of the MRR System shall bend at the minimum temperature requirements without the insulation cracking.	Shall	Test	Inspection
3.5.3	Electrical Standards. The electrical installation on the MRR System shall meet the requirements of the Canadian Electrical Code Part 1, C22.1-02.	Shall	Inspection	Infer from first article
3.5.4	Marking. Caution, warning, danger and instructional markings on the MRR System shall be in a bilingual format in both the English and French languages.	Shall	Inspection	Inspection
3.5.5	Nomenclature. Military nomenclature shall be assigned to the MRR System in accordance with Canadian Armed Forces Standard D-01-000-200/SF-001 and MIL-STD 196.	Shall	Inspection	Inspection
3.5.6	**Identification**	Title		
3.5.6.1	Identification marking shall be applied to major assemblies and loose assemblies of the MRR System in accordance with Canadian Armed Forces Standard D-02-002-001/SG-001.	Shall	Inspection	Inspection
3.5.6.2	In addition to the mandatory marking information, the system weight and dimensions shall be included. Note: Weight and dimension information is for transportation.	Shall	Inspection	Inspection
3.5.7	**Reliability**	Title		
3.5.7.1	The MRR System shall have a minimum Mean Time Between Critical Failure (MTBCF) of 500 hours not including any Government Furnished Equipment (GFE).	Shall	Analysis	Infer from first article
3.5.7.2	The MRR System should have a MTBCF of greater than 500 hours not including any GFE.	Should	Analysis	Infer from first article
3.5.7.3	The electrical generator system including the engine shall have a minimum MTBCF of 600 hours.	Shall	Analysis	Infer from first article
3.5.7.4	The electrical generator system including the engine should have a MTBCF of greater than 600 hours.	Should	Analysis	Infer from first article
3.5.7.5-1	Mission Failure or Critical Failure shall be defined in accordance with STANG 4158.	Condition		
3.5.7.5-2	Mission essential functions are all mandatory requirements as specified in the SPS specification in Para 3.1 and Para 3.2 including all the subordinate paras.	Condition		
3.5.7.5-3	Any other failures that prevent the MRR System from performing the mission essential functions shall also be defined as mission essential functions.	Condition		
3.5.7.6	Reliability predictions shall be determined by mathematical derivation and calculation as described in MIL-HDBK-217F and MIL-STD 1629A.	Condition		
3.5.8	Durability. The MRR System shall be able to perform at least 30 battle field days per year over the expected lifetime of the MRR System.	Shall	Analysis	Infer from first article
3.5.9	Supportability. The MRR shall be supportable without major redevelopment associated with obsolescence for an initial period of 5 years.	Shall	Analysis	Infer from first article
3.5.10	**Battlefield Day.**	Title		
3.5.10.1	During a battlefield day of a medium intensity scenario, each MRR System shall be expected to perform the following:	Header		
3.5.10.1.a	18 hours operational;	Condition		
3.5.10.1.b	4.0 hours mobile (four moves per day) including the time to deploy and tear down for a daily total of:	Condition		

3.5.10.1.b.i	50 km on paved roads;	Condition		
3.5.10.1.b.ii	14 km on rough tracks; and	Condition		
3.5.10.1.b.iii	6 km cross-country; and	Condition		
3.5.10.1.c	Remaining time non-operational (non-continuous, maintenance can be carried out during this time).	Condition		
3.5.11	**Geospatial Data Requirements.**	Title		
3.5.11.1	The MRR System shall use Digital Terrain Elevation Data (DTED), MIL-PRF-89020, to compute locations automatically in accordance to the Performance Specification.	Shall	Demonstration	Infer from first article
3.5.11.2	The MRR System shall use all applicable levels of DTED data to achieve the accuracy requirements set herein.	Shall	Demonstration	Infer from first article
3.5.11.3	The MRR System shall have a digital graphical map display capability.	Shall	Demonstration	Infer from first article
3.5.11.4	The following are the mapping products that shall be used for the MRR System display:	Header		
3.5.11.4.a	Compressed ARC Digitized Raster Graphics (CADRG);	Shall	Demonstration	Infer from first article
3.5.11.4.b	Digital Terrain Elevation Data (DTED);	Shall	Demonstration	Infer from first article
3.5.11.4.c	Controlled Image Base (CIB); and	Shall	Demonstration	Infer from first article
3.5.11.4.d	Shape Files (.shp).	Shall	Demonstration	Infer from first article
3.5.11.5	The graphical map display shall displaying grid lines identified by UTM, MGRS and Latitude and Longitude data.	Shall	Demonstration	Infer from first article
3.5.11.6	The graphical map display shall have the capability to display all graphical map data using the World Geodetic System 1984 (WGS 84) horizontal datum.	Shall	Demonstration	Infer from first article
3.5.12	**Clutter Model**	Title		
3.5.12.1	Rain Clutter Characteristics. The MRR System in all modes shall operate in accordance with all the specifications during rain fall at 4mm/ hr. The range extent for rain is 30 km cross range and 30 km down range with respect to the radar coverage and extends uniformly to a 4km height. Specified radar performance in 4mm/hr rain is required over the entire down range extent of the radar coverage. In addition, the rain clutter in the context of the Medium Range Radar has the characteristics as defined in the following paragraphs:	Shall	Analysis	Infer from first article
3.5.12.2	Land Terrain Clutter Characteristics. The MRR System in all modes shall operate in accordance with all the specification in the presence of land terrain surface clutter. The surface clutter model is defined in the book Low-Angle Radar Land Clutter: Measurements and Empirical Models by J. Barrie Billingsley. See chapter 4 for the Clutter Model. See Table 4.2 Multi-Frequency Weibull Parameters of Land Clutter Amplitude Distributions page 295 of Low-Angle Radar Land Clutter: Measurements and Empirical Models by J. Barrie Billingsley. Table 4.2 reproduced below, gives the Weibull parameters of the land clutter that the MRR System shall be able to operate in the present of. With respect to the MRR System, the land terrain clutter characteristics can best be described by the rural terrain as shown in Table 4.2, for example, agricultural, forest, shrub land, grassland, wetland, and desert regions.	Shall	Analysis	Infer from first article