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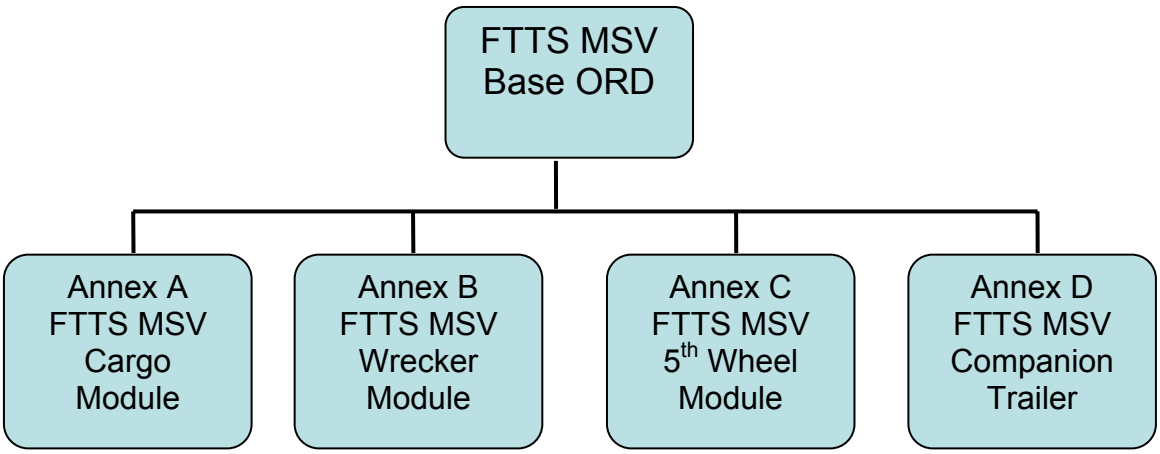
In an effort to make this document easy to use and understand, the requirements for the FTTS have been organized into levels. The capability requirements common to the FTTS platforms are listed in the base document. Annexes have been attached to the base document to provide organization to the detailed requirements. At each successive level, the requirements become more focused to individual system-unique requirements. Annex structure is shown at table ___.



FTTS blocking strategy is still in development/refinement. For the purposes of preparation for Milestone B decision, the FTTS requirements will be displayed with the threshold as the minimum acceptable operational value below which the utility of a system becomes questionable and the objective being the full objective capability.

Definitions. The following definitions apply unless otherwise stated:

Curb Weight (CW) = Empty vehicle, full fuel, lubricants, coolant, and BII.

Gross Vehicle Weight (GVW) = CW plus the weight of 2 soldiers (4 soldiers desired) and their individual equipment and weapons, trailer tongue weight (10 percent of the towed load GVW), crew compartment protection kit, and payload (payload includes mission essential support equipment, unique digital appliqué, and non-mission essential kits, such as cargo compartment heater kit and cargo compartment protection kit). The planning factor per soldier with individual equipment is 343 pounds (weight estimates per Brigade Combat Team developmental weights).

Gross Combined Weight (GCW) = GVW plus weight of the towed load. All characteristics requiring evaluation at GCW shall be performed using the FTTS-MSV companion trailer at its maximum payload as well as towed loads required for specific mission applications.

System Performance. Unless otherwise specified, the following characteristics apply to all FTTS-MSV versions at GCW towing a representative trailer weighing (TBD) pounds having a tongue weight of (TBD) pounds over the Operational Mode Summary/ Mission Profile (OMS/MP) speed and terrain profiles. Following are the system operational performance parameters (capabilities and characteristics):

Design Characteristics:

Responsiveness.

FCS information and sustainment systems (FTTS-MSV) must support the simultaneous, multi-modal insertion of UA forces into multiple austere points of entry without reliance on fixed ports and staging bases.

Rationale: The Combatant Commander must have the ability to employ the UA using multiple points of entry with its organic command and control and sustainment systems that will allow unity of command and effort while dispersed. This requires the introduction of the UA at multiple points of entry that are unpredictable to overcome enemy access denial, to be able to leverage austere points of entry to increased force flow, to increase transport options available to the combatant commander. Analysis shows that the enemy, using asymmetric means, can inflict heavy damages before we are ready to fight, during conventional Reception, Staging, and Onward movement and Integration (RSO&I). We need the capability to operate without the requirement for elaborate APODs and SPODs, as well as the ability to project forces ready to fight. Entry into an austere theater, through multiple unimproved points without relying on fixed ports and staging bases, mitigates problems of enemy access denial strategies.

Mission Profile. FTTS MSV must be capable of employing over ranges of 600 miles (Threshold) and 900 miles (Objective). Upon arrival, the FTTS must support the UA capability to conduct distributed and continuous 24-hour operations, self-sustained, for a minimum of three days without requiring reception and staging.

Rationale: Upon arrival, UA combat units immediately employ over operational distances (up to 400 km) to designated area(s) of operations a coherent, integrated combined arms team with the ability to conduct their core mission tasks with an area of influence of 75 km. FSB units must provide continuous support over distances of 60 km one way to combat units. FSB units must be able to march this distance several times within 3 days without external refuel.

Operational Range (Key Performance Parameter (KPP)). As a measure of fuel efficiency, fuel consumption and storage shall not be greater than current

predecessor systems over the mission profile representative terrain while maintaining an effective operational range of 600 miles (Threshold) 900 miles (Objective) before refueling.

Rationale: To achieve reduction in logistics footprint, sustainment forces must reduce fuel consumption and support forces over extended distances without pause. The threshold is representative of the doctrinal distances that the UA will deploy and the FSB must retain the capability to return to a sustainment site to resupply/pick up more supplies.

Payload.

Cargo module (Annex A) and its **companion trailer** (LHS version) (Annex D) shall each carry 13 Short Tons (ST) total payload consisting of cargo laden flatracks / CROPS / modules / shelters / modular/configured loads and/or other containers / tank racks / quadcons / tricons or LHS compatible devices (i.e. with integrated bail bar or other LHS compatible lift point) (herein referred to as LHS payloads).

Crew Cab. The FTTS MSV shall provide capability for a crew of up to 4 personnel (2 crews) to conduct 24 hour operations. Crew is defined by all prime mover and/or other systems' operators supported by the prime mover.

Rationale: The FTTS will be used to transport systems which typically have a crew of 3-4 operators. Having a cab capable of carrying up to 4 personnel will allow 24 hour operations while reducing vehicle requirements for transporting equipment operators.

Seating. All seating shall be designed to safely accommodate soldiers outfitted with combat gear (i.e. Load Bearing Equipment (LBE) and flack vest, Mounted Warrior Soldier System (MWSS), etc.) and/or Mission Oriented Protective Posture IV (MOPP IV) equipment to include headgear.

Primary Crew Seats. The FTTS-MSV shall have at least two primary crew seats (Threshold) (four primary crew seats - Objective), which are ergonomically designed to provide leg, back, shoulder, and head support. The driver's seat shall be adjustable to accommodate 5th to 95th percentile soldiers.

Rationale: Ergonomically designed seats are needed to combat driver fatigue and support extended tactical operations. The Objective four-seat configuration permits transporting four-soldiers with their modular system without the need for an extra vehicle. An adjustable driver's seat is needed to accommodate the variation in sizes of the potential military drivers.

Secondary Crew Seating. Seating for at least two additional soldiers shall be provided for use in such missions as command and control and radio relay operations. The seating shall be separately foldable flush into the deck or

sidewalls of the cab. This seating shall be ergonomically designed to provide leg, back, shoulder, and head support.

Rationale. Four personnel may be required for transported module operation; therefore, seating for at least two additional soldiers is required. The FTTS-MSV is expected to perform a wide range of missions; therefore, seating which folds into the deck is needed to permit ease of vehicle reconfiguration and maximizing cargo deck space while still retaining the seats on the vehicle for future use and separately foldable increases flexibility. The ergonomically designed seats are needed to increase the potential for the occupants arrive at destination in a combat ready state.

Crew Compartment Operating Environment. The FTTS-MSV shall have internal environmental control measures to ensure personnel can work in the vehicle for extended periods of time. For systems with the crew compartment protection kit installed cab-cooling requirements shall be met with windows closed. (A kit may be used to meet this requirement. If a kit is used, it shall be installed at field level or below.)

Rationale. This vehicle will be operated throughout the world as exigencies dictate. The FTTS-MSV crew may be required to perform in temperatures as high as 120 degrees F and as low as -50 degrees F. Prolonged exposure to these temperatures can cause extreme fatigue and or permanent physical injury. The FTTS-MSV needs to allow for sustained operations in daylight and darkness and while the crewmembers are wearing MOPP IV gear (10 hours of continuous operation) to ensure that the crew of the FTTS-MSV remains mission capable. When the armor protection is installed, windows must be kept closed to maintain ballistic protection; hence, the need for cab cooling with windows closed. Use of a kit to provide a safe and comfortable cab-operating environment may be more cost effective than equipping all vehicles with this capability from the factory.

Vehicle Control Enhancement. The FTTS-MSV shall include active and passive vehicle control enhancements (e.g., integrated seat and restraint systems, improved brakes, traction control, etc.) that provide for maximum control of the vehicle during the full range of vehicle mission profile to include off-road use and emergency conditions. These enhancements shall also allow the FTTS-MSV to exhibit safe stability and handling characteristics at all speeds, up to and including maximum speed, during normal and emergency lane change maneuvers.

Rationale. Control enhancements provide for safer operation of the vehicle when operated closer to the design limits of the FTTS-MSV. This will provide for a more safe, effective, and efficient vehicle when operated across the mission terrain profile. Also, it is expected that the FTTS-MSV will be operated on public

highways around the world where lane change operations at varying speeds will be a routine occurrence. Additionally, emergency conditions may require rapid lane change corrections. Army drivers of all levels of experience and training backgrounds will drive the FTTS-MSV; therefore, the vehicle must not exhibit any unusual or unsafe characteristics.

Vehicle Security. The FTTS-MSV shall have a means to provide vehicle security (e.g., door locks, locking hatches and fuel tanks, etc.). The security system shall provide the capability to lock the entry points from inside the vehicle without inhibiting a quick exit from the vehicle. When the FTTS-MSV is locked from the outside, it shall be in compliance with requirements for securing communications equipment when vehicle is unattended, but shall not inhibit quick exit from the inside.

Rationale. Vehicle security is needed to prevent unauthorized access to the interior of the vehicle during operations while allowing rapid exit of the occupants in the event of an emergency. Vehicle security is also required to prevent unauthorized access to vehicle equipment when vehicle is unattended.

Operations Using Arctic and MOPP IV Clothing. While wearing individual arctic protective clothing and MOPP IV protective gear, under anticipated operational conditions, the crew and maintainers shall be able to conduct safe, effective, and efficient operations and maintenance on the vehicle, with or without towed loads.

Rationale. The FTTS-MSV will be subject to use in a wide variety of weather and tactical conditions. Soldiers must be capable of operating and maintaining the vehicle while wearing cold weather and NBC protective clothing.

Load Towing Characteristics.

Companion Trailer Towing. The FTTS-MSV shall be capable of safely towing, over the FTTS-MSV OMS/MP, the FTTS-MSV companion trailer described in Annex ___.

Rationale. The FTTS-MSV needs to be able to safely tow the companion trailer to ensure all UA systems using an FTTS-MSV trailer as an Associated Support Item of Equipment (ASIOE) can be relocated on the future battlefield.

Backward Compatibility. The FTTS-MSV shall be able to safely tow legacy trailers over the FTTS-MSV OMS/MP. Achieved speeds of the FTTS-MSV and towed system combination shall be equal to or greater than those achieved by the predecessor TWV and the same towed system.

Rationale. The FTTS-MSV must be backward compatible with the existing towed loads to ensure all mission-required equipment will be adequately supported on the future battlefield. It is recognized that such operation may

result in reduced FTTS-MSV performance level to be compatible with the towed load.

Towed Load Brake Control. When applicable, the FTTS-MSV shall have the capability for positive control of towed system brakes.

Rationale: Future military trailers/towed weapons systems that operate in both directions are expected to have positive braking systems to avoid mobility degradation and safety hazards caused by surge brakes. This requirement will ensure future compatibility.

Towed Load Power and Control. When applicable, the FTTS-MSV shall be capable of providing power and active control of the towed load.

Rationale: Future military trailers/towed weapons systems may have integral motors that provide enhanced off-road mobility. This requirement will ensure compatibility with this type system.

Second Pintle. The FTTS-MSV shall have the capability to mount a second pintle on the front of the vehicle. The pintle may be demountable for use on both front and rear of the vehicle.

Rationale: A front mounted pintle is needed to facilitate combat loading of trailers/ howitzers in U.S. Air Force aircraft and to provide ease of trailer/howitzer emplacement in field positions, aircraft relocation on the airfield, and relocation of trailers in ship holds.

FTTS MSV (Wrecker) module (Annex B) shall retain the same lifting and towing capability as any variant of the HEMTT wrecker and shall be able to tow/recover any variant of the FCS, IAV, HEMTT, PLS, FMTV, HMMWV, M915 family, M939 family (to include M931 and M932 variants) from either the fore or aft or at a side angle not to exceed 60%.

MSV 5th wheel module (Annex C) shall tow a semi-trailer (weight TBD) with up to 40 ST payload.

Rationale: The FTTS will interface with current and interim force equipment and will replace the HEMTT in Objective Force units. It must retain the same capabilities as the equipment it replaces.

C4I

FTTS on-board information system must provide all manned systems the ability to integrate into a joint, secure, network system from alert through deployment to employment and and be able to connect into the gaining command's C4ISR architectures during movement by air, land and sea. The system must interface with the CROP and Defense Transportation System (DTS)

to allow the Joint Task Force (JTF) to adjust responsiveness and adapt to a dynamic Joint Operational Area (JOA).

Rationale: Supports mission planning, mission rehearsal, battle command, and ability to integrate into gaining C2 architectures during movement by air, land and sea.

Systems PMs shall integrate with the Common Relevant Operating Picture (CROP) via embedded C4I equipment on the FTTS-MSV to include different types of suites, architectures, network peripherals, subsystems, and radios. The FTTS-MSV shall have sufficient space and power for on-board integration of C4ISR systems without inhibiting any vehicle operation by any operator within the cab space of the FTTS-MSV (to include line of sight, safety issues, MANPRINT, ergonomics, etc…) or without using room dedicated for TA-50, individual weapons, rucksack/backpack storage, crew gear, duffle bags, or other cab occupant belongings.

Rationale: Network centricity is an underlying principal of the Objective Force.

Signature management. FTTS-MSV shall have onboard signature management to counter the enemy's ability to acquire and engage our forces. They must have passive and active survivability capabilities to detect and counter an enemy's acoustic, visual, and electromagnetic acquisition means.

Rationale: The FTTS-MSV must have the same signature management capabilities as the forces it supports. Tactical formations must be able to move to positions of advantage without detection or degradation to combat operations. Platform survivability is directly related to the ability of the threat to detect the platform using a wide array of detection sensors. Optimization of signature management capabilities n[illegible]mizes system protection.

Deployability

The FTTS-MSV and its companion trailer shall be transportable worldwide without disassembly and without shoring at its gross combined weight (GCW) by highway, rail, water, and air modes up to the allowable payload and dimensional limits of each respective transport carrier without waivers. When transported at GCWR, the trailer with load or empty will stay connected to the prime mover with load or empty as the situation allows.

Rationale: Increases the options available to the Combatant Commander for entering forces into theater and maximizes force flow using multiple entry points to bring in combat configured units, enabling responsive operational and tactical movement and maneuver insupport of distributed operations. This capability improves not only our enty capability but also the continued flow of

forces later in the campaign for decisive operations. Transporting the FTTS-MSV and its companion trailer with a maximum payload will decrease the number of trucks and/or supply loads needed to accomplish a mission.

One FTTS-MSV or its companion trailer shall roll on-roll off under its own power onto a C-130 (any model) or C-130 like aircraft with up to and including a 6 ST payload and without the GVW exceeding 18 ST. Four at GVW or two at GCW shall be transportable without disassembly and without shoring and shall roll on-roll off under its own power aboard a C-17 (any model). Eight at GVW or four at GCW shall be transportable without disassembly and without shoring and shall roll on-roll off under its own power aboard a C-5 (any model). All FTTS-MSV and companion trailers shall be certified for air transport without waiver.

Rationale: Six short tons is half the projected gross combined platform weight of the Modular Platform System (MPS). By not exceeding 16 ST at GVW, the C-130's range will be maximized to a 1,000 nautical miles with enough fuel to jump an additional 250 miles to a refuel point. Preclusion of waivers decreases preparation time needed to make the FTTS-MSV air transportable.

The FTTS MSV must be transportable up to 750 NM (threshold) 1000 NM (Objective) by C-130 profile aircraft IAW MTMC/TEA C-130 White Paper dated 11 Sep 02. Once off loaded, the FTTS must be capable of rapid transition to Full Combat Configuration missions postures with Objective operational range capability.

Rationale: C-130 deployment ensures the Combatant Commander's operational mobility, flexibility, and agility by increasing inter and intra-theater mobility options and enabling responsive operational and tactical movement and maneuver in support of distributed operations.

The FTTS-MSV and its payload shall not require more than 15 total minutes to prepare for embarkation or debarkation on any form of transport (air, land, or sea).

Rationale: The Unit of Action will rely on unit integrity and rely less on lengthy embarkation/debarkation time when deploying to an Area of Operation. The FTTS-MSV can not cause combat ineffectiveness due to increased prep time or time due for mission configuration/re-configuration.

The FTTS-MSV and its companion trailer shall be deployable on participating VISA ships.

Rationale: VISA ships will be used to deploy forces and equipment when military or other government transportation means are not available.

Transportability

The FTTS-MSV and its companion trailer shall have sufficient and clearly marked non-removable lift and tie-down provisions able to support the lifting or tie-down of the FTTS-MSV at GVW on any acceptable means of transport (i.e. ship, aircraft, trailer, railcar, etc…) and without use of special lifting slings or tie-down devices.

Rationale: The FTTS-MSV and its companion trailer may be loaded with maximum payload when transported or moved via lifting. Clearly marked points will allow workers to identify correct points on the FTTS-MSV and companion trailer to use, thereby precluding unnecessary damage while transporting the FTTS-MSV and companion trailer.

The FTTS-MSV and its companion trailer shall have sufficient provisions for securing any payload to itself (including LHS payloads) up to and including 13 ST for transport on any acceptable means of transport (i.e. ship, aircraft, trailer, railcar, etc…).

Rationale: The FTTS-MSV will be transported with a variety of loads up to and including 13 ST dependant on the maximum payload capability of the transporting system.

The FTTS-MSV shall at GCW and GVW negotiate a 15 degree approach angle and break-over (departure) angle without overloading axle or floor loads both forwards and backwards while egressing / ingressing without need for specials ramps, blocking or bracing, or other dunnage and without any part of the FTTS-MSV or trailer except for the tires touching the ground, ramp or compartment (cargo) area/floor.

Rationale: The FTTS-MSV and companion trailer will be transported on ships and aircraft with ramp angles up to and including 15 degrees. Preclusion of dunnage or other materiel expedites the embarkment/debarkment time.

C-130 Logistics Rails. At no time during loading, flight, or off loading shall any portion of the FTTS-MSV vehicle make contact with the C-130's logistics rails.

Rationale: If the FTTS-MSV were to contact the rail system, damage could be done to the FTTS-MSV or the rails and make either non-mission capable.

The FTTS-MSV and its companion trailer shall not require overweight/over dimensional permits either when operated as a self-propelled vehicle or when carried as cargo by ground transportation assets in the United States, NATO countries, or other allied/ host nations.

Rationale: The FTTS-MSV and its companion trailer will be used in Operations Other Than War (OOTW). By precluding permits for over-the-road movement, increased flexibility is given to the commander to move the FTTS-

MSV across varying lines of communication to ensure maximum transportation flexibility.

Surface Transport. The FTTS-MSV at GCW, GVW, and CW and the FTTS-MSV companion trailer at GVW and CW shall:

Meet highway legal limits, without waivers or special permits, for all countries in which the FTTS-MSV will be operated (current military installations and deployment sites both stateside and abroad).

Have military standard lifting and tie-down provisions to allow for loading and securing on all authorized means of transport.

Be rail transportable worldwide. Rail transport at GCW shall be performed with the towed load coupled to the FTTS-MSV.

Be marine transportable by LCM-8, and larger vessels/ships to include RO/RO vessels.

Rationale. All vehicles must adhere to highway legal load limits, vehicle size restrictions, and towed load restrictions, wherever they may operate to eliminate need to obtain special permits. Military standard lifting and tie-down provisions are essential for safe and efficient shipping of the FTTS-MSV and its companion trailer by rail, sea, and air. Transport by LCM-8, and larger vessels/ships is required for Logistics Over-the-Shore operations (LOTS). The RO/RO vessel compatibility is needed to permit worldwide shipment.

Agility

Ride Quality. The FTTS-MSV shall meet the ride quality requirements at GVW and CW plus 2 occupants.

Ride Limiting Speed. The FTTS-MSV shall attain no more than 6 watts average vertical absorbed power, as measured at the occupants' location as well as the entire cargo compartment of the FTTS-MSV and its companion trailer, while negotiating the following Root Mean Square (RMS) ride courses at speeds listed below, with the tires at normal tire pressure (cross-country tire pressure, if equipped with a Central Tire Inflation System [CTIS]).

232 6-Watt Speeds (MPH)

Version	RMS (inches)			
	1.0	1.5	2.0	2.5
GVW	30	20	15	13
CW plus 2 Occupants	25	18	13	11

Vertical Acceleration. The FTTS-MSV shall sustain no more than ___-G peak vertical acceleration, as measured at the occupants' location as well as the entire cargo compartment of the FTTS-MSV and its companion trailer, while negotiating a non-deformable, half-round obstacle at the rated speed as listed below with the tires at normal tire pressure (cross-country tire pressure, if equipped with a CTIS).

Obstacle Crossing Speeds (MPH)

Version	Obstacle Height (inches)			
	4	6	8	10
GVW	50	16	15	5
CW plus 2 Occupants	45	18	15	10

Rationale: Needed to provide a ride quality that permits continuous operations in most areas without serious detrimental effect on the occupants and equipment.

The FTTS-MSV shall negotiate a three-point turn within a 50-foot wide well deck or a single point turn within 80-foot wide (Threshold) 72-foot wide (Objective) TSV cargo hold area.

Rationale: The FTTS-MSV will be located in cargo holds of ships with little turning room and must allow expediency in turning or negotiating within the hold.

The FTTS-MSV at GVWR shall be capable of stepping up and down a vertical obstacle of 32 inches in forward and reverse without preparation or modification of the vehicle.

Rationale: In order to assure operational momentum, support systems require mobility capability equal to supported system.

The FTTS-MSV shall allow the operator to safely control the vehicle in the event of sudden power loss.

Rationale: Steering and braking capability not dependent on a powered system will give the operator the capability to safely control the vehicle.

The FTTS-MSV and its companion trailer shall ford a 48" (Threshold) or 60" (Objective) deep water obstacle without preparation, special kits, or other fording device in forward and reverse while maintaining contact with the ground.

Rationale: Provides operational flexibility to maneuver over a wide variety of terrain and natural water obstacles. Reduces the need for integral or augmented engineer mobility support assets.

FTTS-MSV must be capable of traveling on a hard surface road that has no more than +2% grade at sustained speeds of 90kph.

Rationale: Permits sustained speeds for movement by road of operational distances. Enables sustainment of combat forces at a time, place and method of our choosing. Supports decisive maneuver.

Rationale: Required to provide additional survivability to soldiers facilitating agile movements to destroy enemy forces or avoid engagements. Dash speed is based on known threats, engagement ranges, and time of flight for anti-tank guided missiles (ATGMs).

FTTS-MSV must be capable of traveling cross-country at sustained speeds of 50kph.

Rationale: Supports decisive maneuver, and provides critical freedom of action, high tempo and velocity. Support systems require mobility capability equal to supported systems.

Range. The FTTS-MSV shall be capable of operating on internally carried fuel for a minimum distance of at least 600 miles (T), 900 miles (O), at GCW across the OMS/MP. Internally carried fuel includes all fuel tanks at no more than 95 percent full, with 5 percent allowed for ullage.

Rationale. The range will ensure that the FTTS-MSV has the ability to sustain itself for 72 hours without resupply in a high intensity battle and another four days in a low intensity environment and maintain momentum with the UA on the battlefield.

The FTTS-MSV at GVW must be capable of crossing trenches with a width of no less than 59 inches in forward and reverse without preparation.

Rationale: The FTTS-MSV and its companion trailer must be able to cross trenches without additional mobility support augmentation in order to preserve operational momentum. This trench crossing capability will allow for the FTTS-MSV to cross approximately 30% of known gaps in the world based on current gap crossing studies.

Slopes.

FTTS-MSV from CW to GCW shall be capable of climbing and descending in forward and reverse a longitudinal 60 percent dry hard surface slope with no degradation in steering.

Rationale: This allows the platform to negotiate steep hills, valleys, and man-made objects that are typical in cross-country and urban terrain.

The FTTS-MSV from CW to GCW shall be capable of holding in either direction on a 30-percent longitudinal slope using only the parking brake with the engine off and the transmission in neutral. Longitudinal slope operation shall be performed in both ascending and descending directions without loss of stability, malfunction, or degradation of stated requirements.

Rationale: Adequate brakes are necessary for safe control on slopes. The ability to stop, park, and restart on longitudinal slopes is necessary to ensure adequacy of parking brakes and engine fuel and lubrication systems and to permit full operation on RO/RO vessels. Achievement of the Objective will allow for a safety margin during operations in rolling sea conditions where the angle may vary.

Speed on Grade. The FTTS-MSV and its companion trailer both at GCW shall be capable of ascending a 5-percent grade at 55 MPH (Threshold) (60 MPH – Objective):

Rationale. Meeting this requirement ensures adequate motive power for operations in hilly to mountainous terrain and is in consonance with the capabilities of predecessor vehicles. Achievement of the Objective speeds will increase the combat effectiveness of the unit as the assets are relocated on the battlefield.

The FTTS-MSV from CW to GCW shall be capable of traversing a dry hard surface side slope up to and including 40 percent. Side slope operation shall be performed with either side of the vehicle facing up slope and without loss of stability or malfunction/degradation of stated requirements or loss of vehicle fluids.

Rationale: Supports the concept of assured mobility. Support systems require mobility capability equal to supported systems. Thirty percent is the standard for military vehicles traversing side slopes. With the variety of worldwide deployment locations, operations with side slopes up to 30 percent will be encountered. Negotiating these slopes is essential for overall battlefield maneuverability.

The FTTS-MSV and its companion trailer shall be capable of being recovered/lift and flat-towed from both the front (at GCW) and rear (at GCW) with no disassembly required. Normal preparation may consist of attaching electrical whip, tow bar attachments, and air lines.

Rationale: Ensures the FTTS-MSV can be recovered and evacuated by Army wheeled wreckers..

Tow Eyes. Tow eyes on the FTTS-MSV must be of sufficient strength to withstand the maximum forces encountered while being used for towing and winch recovery operations.

Rationale: Towing eyes will be used for both towing and winch recovery operations; therefore, they must be of sufficient strength to be suitable for these operations.

Mission Profiles.

Upon entry into the AO, FCS FoS (FTTS-MSV) combat units move over operational maneuver distances (up to 400 km) to designated area(s) of operation as a coherent, integrated combined arms team with the ability to conduct their core mission tasks. They will conduct operations with a combat radius of 75km.

Rationale: Current analysis and technology suggests that 750km combat range is possible at threshold. It is estimated that a 1000km operating range will satisfy the most extensive and challenging UA operations.

"FTTS-MSV Tactical Mobility" is defined as 30 percent improved roads (paved and gravel) and 70 percent unimproved roads (trails) and cross-country. Cross-country includes beaches, forests, grasslands, tropical jungles, mountains, and deserts throughout all seasonal conditions

Road Surface	Terrain	% Operation	*RMS Range
Improved	Hard Surfaced	10	0.1" - 0.3"
	Gravel	20	0.3" - 1.0"
Unimproved	Trails	30	1.0" - 3.4"
	Cross-country	40	1.5" - 4.8"

* Root Mean Squared (RMS) is a measure of surface and terrain roughness used to evaluate trafficability.

Rationale: Operational Mode Summary/Mission Profile

Versatility

FTTS-MSV shall have sensors which collect and transmit fuel on-board, rounds remaining, potable water on-board, and rations on-board.

Rationale: For notification of out-of-cycle resupply, cross-leveling and reduces sustainment requirements

FTTS-MSV shall be compatible with standard common support equipment for refueling, rearming, resupply, servicing, and material handling.

Rationale: Standardize support equipment

Ammunition Certification: The FTTS-MSV and its companion trailer shall be certified for ammunition transport.

Rationale: FTTS-MSV will be the primary ammunition distribution vehicle

Electrical Components. The FTTS-MSV shall have the following electrical components:

NATO electrical slave receptacle with electrical capability to jump-start vehicles with 24 volt starting systems.

Rationale. The incorporation of NATO electrical slave receptacles is needed for starting disabled vehicles on the battlefield.

Secure lighting and blackout drive.

Rationale. Required for operations in night combat environments.

Basic electrical outlet (to include on/off switch) in the crew compartment for 12 volt Direct Current (DC) and 24 volt DC, supplemental power for plugging in electrically operated devices (e.g., hand held radio and MWSS battery chargers, computers, flashing warning lights, mounted water ration heater, etc.).

Rationale. Vehicle integrated dual power sources are required to permit rapid installation of ancillary equipment needed for mission accomplishment.

Electrical power source outlets 12 and 24 volt outlets in the cargo compartment with minimum interference with the cargo (110v AC).

Rationale. Required to facilitate quick hook-up of systems with which the FTTS-MSV will be associated and that require vehicle provided electrical power delivered to the cargo area.

Vehicle Electric Power Source.

A 28 Volts DC power source of at least a 200 amperes delivered output at vehicle engine idle speed. A 400 amperes power source kit shall be made available for systems requiring more than the basic 200 amperes. Systems

requiring more than 400 amperes must provide their own additional power source (i.e., add-on alternator or generator, or a separate generator).

A 120 Volts AC power source of at least 2500 watts continuous delivered output at vehicle engine idle speed provided integral to the vehicle to include associated electrical outlets and power distribution components.

Rationale. Required to support individual vehicle mission requirements and to augment the power as necessary to support present and emerging systems requiring electricity. In addition, some current Signal systems require up to 400 amperes of DC power. By requiring a 400-ampere kit, the integration of power source and truck will be considered at the beginning of the program. Upgraded power sources are required to produce sufficient output power for the varied systems located in the various shelters and present and emerging Combat-Net Radios (CNR) without degrading the vehicle's operating capabilities. Requiring the 200-ampere DC and 2500-watt AC output at vehicle engine idle speed extends battery life by maintaining a full charge and reduces the probability of the engine overheating. Overheating can occur when operating the engine for long periods of time at high idle, as when on radio watch for extended periods. . Integrating access to AC power on-board the vehicle increases capability, deployability, and mobility. Furthermore, low idle output conserves fuel and reduces vehicle signature. The responsibility to provide additional power over 400 amperes must rest with the developer of the system requiring the added power. The FTTS-MSV may have to accept an add-on alternator or some other power generation source to meet this requirement. Since the requirement for 2500-watt AC is generally limited to mission specific roles, a kit to provide AC is acceptable.

Power storage devices shall be of sufficient power to power the vehicle and perform electrical requirements in all climatic conditions and shall be maintenance free.

Rationale. Mature power storage performance characteristics are basic to electrical system design. The maintenance-free characteristic is needed to reduce battery care and maintenance required in the field and need to start the vehicle in all types of weather and power storage must be maintenance free.

The vehicle electrical charging system shall include temperature-compensated voltage regulation, using temperature sensing within the battery compartment, to optimize battery charging.

Rationale. Temperature-compensated voltage regulation will optimize battery charging, improve battery life in extreme climates, and permit use of future advanced technology vehicle batteries. The vehicle temperature performance requirements, the “steady state voltage” design limitations of 25V-

30V DC, and performance input from commercial battery manufacturers will provide sufficient design guidance to the contractor to accomplish this task.

Ancillary Electronic Equipment. The FTTS-MSV shall accommodate the integration of and provide power and space for: i.e. Movement Tracking System (MTS)/Force XXI Battle Command-Brigade and Below (FBCB2), Driver Vision Enhancement (DVE) system, GPS, Light Vehicle Obscuration Smoke System (LVOSS), Maneuver Control System (MCS), NBC M8 Alarm or its replacement, and Identification Friend/Foe (IFF) systems. All of these systems shall be operated/used by the crew directly from the cab without interfering with vehicle operations while vehicle is in motion. Under-the-floorboard conduit shall also be placed in the vehicle for use in wiring future systems that may be mounted on the FTTS-MSV. Power supplied for these systems is in addition to vehicle-required power.

Rationale. The ability to quickly and easily mount/dismount present and emerging technologies is tied directly to the employment of the FTTS-MSV. Communications/ electronics must be considered in the design of the vehicle to ensure adequate space and wiring are available and equipment can be crew operated while the vehicle is in motion. Vehicle structure/body must be strong enough to accommodate these systems. Future systems may require connectivity between the back and front passenger seats and to other onboard systems. Planning ahead for cable routing that will not clutter the interior space will preclude problems. Once these items have been integrated into the vehicle, the vehicle must still have enough power to operate and perform its missions.

Extended Electrical Capability/Capacity. When applicable, vehicle power generation and management shall be provided to power weapons systems, Army Battle Command System (ABCS), and/or support systems and to recharge MWSS equipment by providing at least 30 kilowatts (kW) (Threshold) (50kW Objective) of AC for internal and external operational power demands. Cost of kits, upgrades and distribution systems shall be born by the program for the associated weapon or support system.

Rationale. The incorporation of managed AC electric power provisions is needed to support current and emerging digitization efforts involving Command, Control, Communications, and Computers (C4); intelligence; weapons; Standard Integrated Command Post Shelters (SICPS); and maintenance systems. This capability has the potential to streamline the deployment of Tactical Operation Centers (TOC) and other high energy demanding systems by reducing or eliminating the need for towed generator sets through the application of alternative power generation capabilities (e.g., hybrid energy technology).

Night Vision Device Compatibility. Lighting, instrumentation, and windshield in the crew compartment shall be compatible with the latest generation of night

vision devices. Windshield tinting shall not reduce visibility when using night vision devices.

Rationale. Night vision devices use light intensification and are easily overloaded and subsequently damaged by excessive light. Providing light in the proper spectrum and intensity will eliminate this damage. Certain windshield tinting can reduce visibility when using night vision devices and must be considered in the design of the vehicle. The FTTS-MSV must provide complete blackout driving as well as the ability for co-driver to see the speedometer and other instruments when driving with the monocular goggle. Since the requirement for no aural detection is specified as that achieved by the current HMMWV, the visual detection at night should be at least as good.

Mounting Points. The FTTS-MSV shall have mounting points (fore, aft, and external) and power connections where required, capable of mounting telephones, computers, antennas, mounted water ration heater, camouflage netting (externally), NATO bridge classification placards, flashing warning beacon kit, and mounting brackets for standard Army fuel/water containers.

Rationale. The ability to quickly and easily mount/dismount communications/ electronics and other equipment is tied directly to the employment of the FTTS-MSV and must be considered in the placement of mounting points on the vehicle to ensure adequate strength, space, and wiring are available when the equipment is mounted.

Potable Water.

Water Generation. The FTTS-Variants shall incorporate an embedded potable water generation and storage capability that allows the FTTS-Variants and assigned operator/crew to operate without external water re-supply for a period of 3 days of high intensity or 7 days of low intensity operations.

Rationale: The FTTS-Variants embedded water production capability is needed to enhance flexibility of supply operations, minimize need for special purpose water units and demands, and increases available combat power

tured Water from AC Unit. All condensation from AC unit shall be captured and recycled.

Rationale. All condensation on the AC pipes is potable water and should be captured to ensure conservation and collection of all available water.

Environmental Conditions.

The FTTS-MSV and its companion trailer must successfully perform all functions in all climates geographic areas, and environmental conditions.

Rationale: UA forces expected to be employed worldwide

The FTTS-MSV shall be able to start and operate in temperatures from -25° to 125° F without special kits, maintaining full mission capability (threshold) and –25° F to –50° F with special kits while maintaining 90 per cent mission capability (objective). The vehicle must start and attain operating temperatures in extreme cold in no more than 30 minutes (threshold).

Rationale: UA forces expected to be employed worldwide

The FTTS-MSV and its companion trailer must be capable of being placed in storage at temperatures ranging between –60° F and 160° F without degradation.

Rationale: Support of future contingency will be dependant upon forward storage

Recovery and Evacuation Operations.

Like-Vehicle Towing. The FTTS-MSV at GVW shall be capable of towing any other FTTS-MSV at GVW (Threshold) (GCW – Objective) over the FTTS-MSV mission terrain profile. Reduced speed of 15 percent for this operation is acceptable.

Rationale. To permit evacuation of one FTTS-MSV by another FTTS-MSV during periods when standard recovery vehicles are in short supply on the battlefield.

Each FTTS-MSV must retain sufficient mobility in degraded mode to continue the operation or move to a combat repair location. (Threshold/Objective).

Rationale: Reduces requirement for recovery assets. A mobility degraded mode is when a vehicle suffers a mobility injury, such as a damaged wheel from a land mine, and driven on five of six or seven of eight wheels at a reduced speed to a sustainment area to be repaired.

The FTTS MSV and its companion trailer shall incorporate means to adjust tire pressure to increase cross country mobility. The FTTS-MSV shall incorporate this capability to allow the operator to adjust tire pressure

- From GVW to GCWR
- by axle
- For terrain conditions

The FTTS-MSV and its companion trailer shall have the capability to inflate/deflate while moving tire pressure from the hard surface pressure to sand pressure in 5 min.

Rationale: Improved mobility will be needed over a variety of terrains and in a variety of conditions. The FTTS-MSV must have near instantaneous capability to transition from hard surface to soft surface/austere conditions.

Lethality.

Tactical Security.

Self-Defense Weapons.

Primary. The FTTS-MSV shall have provisions for mounting self-defense weapons (e.g., M2, M240, M249, M60 Machine Gun, or MK-19 Grenade Machine Gun) with ammunition can (if required) on top of the vehicle. The mounting device shall permit operation of the weapon while traversing 360 degrees horizontally with little effort from the gunner and without interfering with other crew operations. Provision to enable the 5th to 95th percentile target audience soldier to operate the weapon (without interfering with other crew operations) is required. A mechanical traverse with a positive travel lock capability is required. The gunner shall be able to perform all crew service functions on the weapon while it is mounted in operating position. Spent brass and links shall not enter the crew compartment. The gunner shall be able to engage targets from within the crew compartment, as well as by a gunner positioned in a ring mount, if provided. (Characteristics for this capability are found in the approved Common Remotely Operated Weapon System (CROWS) ORD, dated 22 Apr 99.) If a full overhead crew compartment protection kit is installed, it is required that the weapon system be compatible with the platform. (Currently writing provisions for a dual weapons mount.)

Rationale. The FTTS-MSV will not always be able to rely on maneuver forces providing security. The FTTS-MSV is expected to make timely and accurate FCS UA supply deliveries in and near the forward area of the battle. The threat strategy will likely include the attrition of FCS supply assets. The ability to incorporate a self defense weapon able to protect the FTTS-MSV from the range of likely threats will increase the amount of supplies reaching the UA. Automatic weapons are essential for vehicle/crew defense against ground and air attacks and especially in urban environments during stability and support operations in which the vehicles may be forced to operate independently. The ability to traverse 360 degrees horizontally gives the gunner the mobility to acquire and engage targets from all directions. The weapon must be accessible to accommodate the variety of personnel that will operate the weapon. A mechanical traversing mechanism is needed to assist the operator to traverse his weapon when firing from the vehicle while it is on an incline. The positive travel lock is needed to prevent the weapon from freely rotating while underway. The requirement for the gunner to be able to perform all normal weapon functions with the weapon mounted is needed to ensure that there is sufficient space to perform such functions as weapons clearing and misfire corrective actions. Keeping spent brass and links out of the crew compartment is needed to prevent possible injury to the crew and to ensure there is no interference with vehicle

operations. The ability to operate these weapons from within the vehicle eliminates the need for the gunner to expose himself to fire.

Gun Shield Kit. A gun shield kit shall be provided for use with the primary weapon station and shall be able to defend against multiple hits from 7.62mm B32 Armor Piercing (AP) rounds or their equivalent. Protection shall be from rounds fired at 100 meters standoff range with no perforation when fired at 0-degrees obliquity horizontally over 0-360 degrees attack directions to the vehicle and to the roof area at 60-degrees obliquity. The gun shield shall be removable at the field level without special tools.

Rationale. The gun shield significantly enhances survivability for the weapons operator as he engages targets. Removal at field level will allow for quick reconfiguration of the system in a combat environment.

Ammunition Storage. Provisions shall be made for self-defense weapon ammunition storage that meet U.S. Army Defense Ammunition Center and School (USADACS) security certification requirements to transport ammunition over the vehicle mission profile. Storage provisions shall have a readily accessible quick release. Space allocations shall be provided for at least the following type and quantity of standard Army ammunition:

Ammunition Type	Quantity
M16	2 cans
M203	1 can
Mk-19, M2 or M60/M240	6 cans
M249	4 cans

Rationale. All ammunition transported on U.S. highways requires certified secured stowage to prevent spillage and damage in transit. The quick release is needed to permit quick access to the ammunition in the event of an attack. The quantities of ammunition indicated are required to support the mission.

Each FTTS-MSV must protect the crew from on-board self-defense weapon stored ammunition detonation and/or fuel fires to minimize crew casualties. Emergency evacuation procedures must not be impeded by having to move or relocate parts of the system.

Rationale: Detonation of on-board ammunition or on-board fire may result in death of occupants or catastrophic kill of the FTTS-MSV. Mechanical solutions that afford maximum protection to the crew and system will prevent loss of soldiers and materiel.

Survivability .

Situational Awareness/Situational Understanding (SA/SU). The FTTS-MSV must interface with the Common Relevant Operating Picture (CroP). (Threshold/Objective) to ensure effective SA/SU.

Rationale: It is critical that the crew of the FTTS-MSV are provided accurate, timely SA concerning their immediate location to accomplish accurate and timely support operations to the FCS UA. Information such as threat locations, local security information, cleared routes, etc is critical, particularly for FTTS-MSV's providing supplies to maneuver forces in and around the forward area.

Crew Safety.

Individual Weapons Stowage. The FTTS-MSV shall have readily accessible quick release, individual weapons stowage (for all versions of the M-16, Squad Automatic Weapon (SAW), M4 Carbine, M203, and the Objective Individual Combat Weapon (OICW)) for up to four soldiers (Threshold) without interfering with the operating functions, controls for vehicle operation, internal equipment controls, and entry/exit doors.

Rationale: The occupants' individual weapons must be readily accessible in the event of enemy contact but must be secured so as not to be missiles in event of an accident or rough cross-country operations and located so as to not interfere with internal vehicle operations.

Crew Restraint System. Each occupant seat shall have modern integrated safety restraint equipment, active/passive, that meets or exceeds Federal Motor Vehicle Safety Standards when operated over the full vehicle mission profile, to include off-road use, at rated speeds. This system shall accommodate a soldier wearing full combat gear (to include LBE, personal body armor, and protective mask) and individual MOPP IV protective gear without interfering with vehicle or crew operation.

Rationale: The restraint system must be designed to allow a combat ready soldier to operate the vehicle throughout the battlefield environment, to include NBC contaminated areas, without impact on operability of the vehicle. Integrating the personal restraint system into the seat provides a more thoroughly unified system that will enhance personnel convenience and usage as well as accommodate a wide variety of operator/crew sizes.

Survivable Space. The FTTS-MSV shall have a cab design that provides sufficient survivable space during an accident for four occupants in the seating areas

Rationale: Adequate cab protection is needed to prevent the occupants from being crushed in an otherwise survivable accident.

NBC Protection:

FTTS-MSV shall possess the capability to detect Nuclear Contamination. This warning will automatically populate the CROP.

Rationale: All UA/UE platforms will be capable of detecting nuclear contamination. This capability will increase element survivability as well as assisting the commander's avenue of approach decisions.

Nuclear. The critical functions of the FTTS-MSV shall survive the initial effects from nuclear weapons where at least one crewmember remains combat effective. The critical functions of the FTTS-MSV shall be High-Altitude Electromagnetic Pulse (HEMP) survivable. The FTTS-MSV does not have to operate through the HEMP event. Recycling power to restore operations after a HEMP event is acceptable. The critical functions of the FTTS-MSV are driving and providing power load and unload the payload. This includes vehicle subassemblies and component parts needed to accomplish these tasks.

Rationale: Provides maximum protection for the individual soldier and FTTS-MSV. Provides continuous operations capability eliminating the need for operational pauses.

HEMP survivability is required to ensure continuation of the vehicle mission and to return crew to reconstitution site subsequent to a nuclear detonation that is otherwise survivable. The inclusion of related vehicle subassemblies and component parts is required to ensure that replacement parts and future upgrades to vehicle components do not degrade or negate the performance of the approved FTTS-MSV configuration(s). In cases where the FTTS-MSV is a critical component of another system, it must survive initial nuclear weapon effects to the level directed by those systems.

Biological. FTTS-MSV shall possess the ability to detect and identify Biological Agents (Objective). This warning will automatically populate the CROP.

Rationale: The proliferation of biological agents throughout the world requires that the FTTS-MSV platforms and systems have the capability to detect and identify biological agents. This detection/identification capability ensures survivability during combat and non-combat operations.

Chemical. Each FTTS-MSV must possess a capability to detect chemical hazards (Threshold) prior to incapacitating dose time. This warning will automatically populate the CROP.

Rationale: This capability provides maximum protection at the individual Soldier level, both on a platform and on the ground. Provides continuous

operations capability eliminating the need for operational pauses. Supports a common situational understanding of the battlespace.

Monitoring. FTTS-MSV must be capable of monitoring personnel for contamination prior to entry of the vehicle (Threshold/Objective).

Rationale: Within the life cycle of the FTTS-MSV, threat forces can be expected to present full spectrum threats from highly effective short, medium, and long range precision and area weapons capable of delivering multi-purpose chemical; biological; nuclear and radiological payloads.

Chemical Agent Resistant Coating (CARC). FTTS-MSV must be hardened against agent absorption to preclude damage to the FTTS-MSV during decontamination operations. Hardening must be such that decontamination will cause no loss of platform functions that cannot be restored at organizational-level maintenance or with a replacement (Threshold)/no loss of platform functions (Objective). Also, the CARC will be able to be touched up without special equipment and monitoring requirements (Objective).

Rationale: Studies show that system effectiveness, unit operational performance, and command and control will be degraded if the Chemical/Biological hazard is not reduced.

The FTTS-MSV shall include the capability to decontaminate personnel and equipment (operational) by use of embedded decontamination systems to reduce Chemical, Biological, Radiological and Nuclear (CBRN) and HAZMAT hazards to negligible risk.

Rationale: Enhances soldier endurance and stamina to fight effectively under all operational and environmental conditions. Provide maximum protection at the individual Soldier level, both on a platform and on the ground. Reduces UA logistical footprint. Immediate decontamination prevents absorption by the FTTS. Studies show that weapon system effectiveness, unit operational performance, and command and control will be degraded if the CB hazard is not reduced.

The FTTS-MSV shall have a CBRN capability to sustain the crew without the use of individual protective over-garments and masks while operating in a CBRN environment for 6 hours (Threshold)/12 hours (Objective). The manned systems capability must allow for exiting the vehicle from one hatch without compromising crew safety to loss of protection.

Rationale: Enhances soldier endurance and stamina to fight effectively under all operational and environmental conditions. Provides continuous operations capability minimizing the need for tactical pauses until the situation allows hasty or deliberate decontamination, or preparation for increased individual MOPP status. Chem Bio excursions conducted in support of MANCEN Rock Drill 13-15 Aug 02 demonstrated extensive reduction in soldier performance and

survivability in systems without overpressure.

Each FTTS manned system must possess a CBRN filtration system that interfaces with individual crew and passenger protective garments and equipment, to allow for continued operation with open hatches

Rationale: Enhances soldier endurance and stamina to fight effectively under all operational and environmental conditions. Provides continuous operations capability minimizing the need for tactical pauses until the situation allows hasty or deliberate decontamination, or preparation for increased individual MOPP status. There may be cases where overpressure system cannot be used. If contaminated soldiers must enter the vehicle or if the hatches must remain open for mission reasons, they need the option to hook up to the vehicle system and take filtered and conditioned air directly to their suites. CANE studies indicate performance reduction differences between collective protection (supplied air) and mask filter only.

FTTS manned systems must include an inside air quality monitoring capability for CBRN/TIC/TIM and carbon monoxide.

Rationale: Enhances solder endurance and stamina to fight effectively under all operational and environmental conditions. Enables FTTS to pass through CBRN and TIC/TIM areas without significant mission degradation or loss of operational momentum. Overpressure and filtration systems do not protect from carbon monoxide and oxygen depleting environments. Without an internal indicator, there is no method of identifying such hazards before soldiers become casualties.

FTTS manned systems must include an indicator of collective protection system performance i.e. residual filter life.

Rationale: Standard filtration systems begin to degrade immediately upon installation. CBRN contamination increases the breakdown of the filter even at a negligible level. End of life can be unpredictable without an end of life indicator. Filter failure will force occupants to don individual protective gear and their performance will be degraded.

Electromagnetic Interference (EMI). The FTTS-MSV shall comply with applicable military EMI and electromagnetic emission susceptibility requirements, and commercial electromagnetic compatibility standards/recommendations as needed to support electronic engine, transmission, braking, CTIS controls, and other vehicle electronic components/controls.

Rationale. Compliance with these requirements (currently MIL-STD-461 Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility) is necessary for operational compatibility with other vehicles and equipment in a military environment. In addition, the application of electronic

controls to major system (Non-Developmental Item (NDI)/Commercial) components has necessitated additional design and performance controls to ensure mutual compatibility.

Crew Protection Protect the crew compartment occupants from the blast, fragments, and injurious acceleration (both vertical, to include the impact of the vehicle returning to the ground, and horizontal) effects of antipersonnel fragmentation mines (to include unexploded artillery sub-munitions -- minimum 500 grams/1 pound explosive weight -- and Claymore type mines) and blast type antitank mines and other blast munitions such as grenades, bomblets, and mortar rounds used as mines (up to the equivalent of 12 pounds (Threshold) (16 pounds – Objective) of TNT explosive weights), pressure detonated under the wheel station, with no fragmentation perforation and no significant crew compartment deformation or permanent debilitating injury to crew compartment occupants. Seats may be designed to attenuate some of the force from the mine blast. Protection provided by the design of the seat shall not degrade soldier comfort or ease of operation.

Rationale: This protection will enhance soldier survivability against mines and explosives in combat and peacekeeping environments.

Ballistic Protection. The FTTS-MSV shall provide integral crew protection in accordance with classified survivability annex (Threshold/Objective) See Annex XX.

Rationale: See Annex XX.

Integral Ballistic Protection. Each FTTS-MSV must provide ballistic protection (structural or add-on armor) to the crew in accordance with classified survivability annex (Threshold/Objective). See Annex XX.

Rationale: In the FCS support concept, support platforms may be required to supply in the forward area. Further, supply platforms must be able to come off tactical airlifters (e.g. C-130) with some level of integral ballistic protection so that they are immediately able to perform supply operations. This integral protection must also be designed in a way that makes additional ballistic protection upgrades (appliques) easy and effective.

Supplemental Ballistic Protection. Each FTTS-MSV must provide supplemental ballistic protection (applique armor) to the crew in accordance with classified survivability annex (Threshold/Objective). See Annex XX.

Rationale: In the FCS support concept, support platforms may be required to supply in the forward area. Contingent on the capability and tactics of the threat being engaged, the ability to have easily applied supplemental ballistic protection is required.

Crew Compartment Applique Protection Kit Maintenance. The FTTS-MSV crew compartment protection kit shall require no maintenance beyond standard Preventive Maintenance Checks and Services (PMCS) performed by the operator using onboard tools. Easily replaceable parts shall permit unit level replacement of portions of the kit without special tools or unique skills.

Rationale. To reduce to a minimum the maintenance burden imposed on the unit and operator by installation of the protection kit or its components.

Crew Compartment Applique Protection Kit Maintenance Vehicle Impact. The crew compartment protection kit design shall not interfere with other maintenance operations of the FTTS-MSV. Easy access to frequent vehicle maintenance areas shall be inherent in the kit design. When parts of the protection kit must be removed for maintenance, they shall be easily and quickly removed and reinstalled so as not to increase the maintenance ratio beyond the requirement.

Rationale. Design of the kit with vehicle maintenance in mind will minimize the increased maintenance burden placed on the unit when in use.

Crew Compartment Applique Protection Kit Storage. The FTTS-MSV crew compartment protection kit shall be designed for storage for extended periods of time without adverse effects from weather (to include ice and blowing snow and sand), humidity, temperature, or sunlight in hot, basic, and cold climates as defined in AR 70-38.

Rationale. It is envisioned that this kit may be kept in long term outside storage in various parts of the world while awaiting use. The kit will not likely be installed in peacetime, except for brief training periods. Available storage space in some unit locations may be limited. Therefore, the kit may not always be stored under the most ideal conditions. It must be fully capable of maximum crew protection upon installation after extended periods of storage under adverse conditions.

Small-Arms Protection. Provide the crew compartment occupants protection from multiple hits from 7.62mm B32 Armor Piercing (AP) rounds or their equivalent. Protection shall be from rounds fired at 100 meters standoff range with no perforation when fired at 0-degrees obliquity horizontally over 0-360 degrees attack directions to the vehicle and to the roof area at 60-degrees obliquity. The spacing between projectile impacts shall be set in accordance with appropriate military standards for the given material. Seat structure may be used to provide some of the 360-degree horizontal protection. Protection provided by the design of the seat shall not degrade soldier comfort or ease of operation.

Area Weapon Protection. Provide protection to the crew compartment occupants against artillery fragments (United States 155mm) with no perforation for each

detonation at a 60 meters (20 meters desired) standoff range for any degree elevation or azimuth to the vehicle. For vehicles with weapons mount, this requirement is with closed hatch.

Rationale: This protection will enhance soldier survivability against small arms ammunition and mortar/artillery fire anticipated in combat and peace keeping environments.

Any appliqué armor kit must be attached in 15 minutes and detached in 30 minutes by the crew without any specialized Material Handling Equipment (MHE) or special tools.

Rationale: The FTTS-MSV requires a capability to have increased survivability measures when the mission or threat dictates by add-on armor and have the capability of rapidly shedding it when weight is a factor. The FTTS-MSV is optimized for transportability and configured to increase survivability by scalable means.

The FTTS-MSV shall have a run-flat capability with tire tread that maximizes off-road mobility while maintaining safe on-road handling and that can achieve tire wear life of a minimum of 12,000 miles (Threshold) (18,000 miles -Objective) of OMS/MP use. The run-flat capability shall permit safe driving after loss of air pressure in any two tires (Threshold) (all tires - Objective) for at least 50 miles (Threshold) (90 miles - Objective) without speed reduction over the OMS/MP terrain.

Rationale: Tire treads need to be designed primarily for off-road missions at tactical standard mobility levels while at the same time they must be safe and suitable for extended highway use as described in the OMS/MP. The run-flat capability is needed to provide a get-away capability when under hostile conditions and a limp home capability in the event of a flat tire while on a combat mission. Tire life is important to maintain reasonable O&S costs and to keep maintenance time devoted to tires to a minimum. The Objective parameters are achievable goals that will reduce O&S costs due to tire wear by up to 50 percent.

FTTS must provide combat identification (CID) of friend or unknown in a Joint, Allied/Coalition environment through platform-to-platform (manned and unmanned, ground and air), platform-to-soldier, soldier-to-platform and soldier-to-soldier under all battlefield and weather conditions across the spectrum of operations. CID systems must interface with the C4ISR communications network for development and maintenance of the COP.

Rationale: The ability of an FTTS CID system to positively identify friendly platforms equipped with compatible/interoperable CID technologies is necessary to prevent fratricide.

Camouflage. The FTTS-MSV shall be painted in NATO three-color camouflage

or desert tan using Chemical Agent Resistant Coating (CARC) or a DA G4 approved substitute (Threshold).

Rationale. Three-color is the standard Army equipment camouflage paint scheme found to possess the ultimate hide capability in tactical operations. Use of CARC or other approved substitute is needed to comply with the NBC requirement in this document. Meeting the Objective will decrease detection thus increasing the survivability of the system in a combat environment.

Interior Lighting. Each FTTS-MSV must have an interior lighting capability that automatically provides white light under closed-hatch conditions and blackout light during open-hatch operations appropriate to the platforms' mission (Threshold/Objective)

Rationale: Degrades enemy detection by signature management and stealth capabilities. A key signature during night operations is the emanation of light.

Sustainability

General

The FTTS MSV must organically sustain itself for three days of high tempo operations without replenishment from external sources in continuous combat in mid-to-high intensity conflict and be self-sustainable for up to seven days in low-end conflict and peacetime military engagement. The UA must be self sustainable fo the specified time/OPTEMPO for Classes I, III, V, VIII, IX, and water.

Rationale: The Army will aggressively reduce its logistics footprint and replenishment demand. This means that the OF will deploy fewer vehicles and leverage combat service support reach capabilities that allow commanders to reduce stockpiles in theater while relying on technology to provide sustained velocity management and real time tracking of supplies and equipment.

Corrosion Resistance. Corrosion resistance shall be sufficient to ensure serviceability for the entire expected 22 year EUL of the vehicle without rebuild.

Rationale: The FTTS will operate and be stored in areas with high slat content, and as such must be operable for extended periods in those environments.

The FTTS and its companion trailer will enable significant sustainment effectiveness and efficiencies through commonality in platforms and components to simplify and reduce logistics, support multi-functionality, reduce personnel and skills required, and contribute to simplification of deployment. The emphasis will be on the FTTS platform/module in addition to lateral commonality with FCS and

will not concentrate on backward compatibility except as specifically addressed in the ORD.

Rationale: Commonality across formations, in platforms and components is required to simplify and reduce sustainment requirements, support multi-functional soldiers, reduce the many personnel and skills required in today's organizations, and contribute to simplification of deployment, maintenance and training, and to reduce equipment and other resource requirements.

Maintenance

Maintenance Ratio (MR) will not exceed 0.025 Maintenance Man-Hours/Operating Hour (MMH/OH).

Rationale: The Army will aggressively reduce its logistics footprint and replenishment demand. The Objective Force will deploy fewer vehicles and leverage reach capabilities. Also, the sustainment system will reduce unnecessary nodes, both physical and decision-making. A "right-sized" sustainment footprint will emerge. Maintenance operations within the OF will be conducted using a vastly different approach from today's legacy structure. Today's structure requires several echelons of maintenance supporting a brigade. The FTTS must be supportable by a two level maintenance system ("Field" and "Sustainment" maintenance). Field maintenance will consist of repair-and-return-to-user on-system tasks, those tasks that do not require disassembly of a component (primarily LRU/LRM replacement), and will be performed forward in the battle space. Sustainment maintenance will consist of repair-and-return-to-supply off-system tasks, those tasks required to return components, subassemblies, and/or end item systems to a serviceable condition. Sustainment maintenance will be performed by military, government civilians, and/or contractors, and will take place at designated locations in the Unit of Employment (UE) Units or potentially as far back as CONUS. The OF has been designed with a significantly smaller footprint in maintenance personnel, and so will require systems that are designed with significant increases in reliability and allow maximum crew/operator repair and maintenance. Plug and play component design of systems and subsystems, coupled with embedded diagnostic and prognostic tools, will greatly enhance the capability of the crews to perform a larger number of maintenance associated tasks. Heavy reliance on operator/crew maintenance is essential to the OF concept of maintenance support and a key factor in the overall reduction of the sustainment footprint. The operator of each FTTS platform/module will be responsible for at least 60% of all field maintenance requirements and limited battlefield damage assessment and repair (BDAR). Each UA will have a small number of 2-3 man combat repair teams (CRTs) within their organic Forward Support Battalion (FSB) to perform field

maintenance requirements beyond the capability of the operator, more in depth BDAR, and limited recovery operations. The immediate maintenance support focus within the UA will be those limited maintenance functions required to keep systems operational until completion of the current operation pulse (72 hours to 7 days). FTTS platforms/modules deemed unsuitable for repair on site (METT-T dependent) will be recovered to a safer location for those repairs necessary to allow the platform to return to action and complete its current mission. Primary method of recovery will be self or like vehicle recovery, augmented by the CRT or UE (Equilvalant) utilizing a FRMV/FTTS-MSV Wrecker as required. Systems requiring extensive repair time, catastrophic failure, or extensive battle damage will be evacuated to effect further repairs and may be replaced with "ready-to-fight" replacements, if available. The FTTS will enable significant sustainment effectiveness and efficiencies through commonality in platforms and components to simplify and reduce sustainment, support multi-functionality, reduce personnel and skills required, and contribute to simplification of deployment.

Preventive Maintenance. FTTS platforms/modules must be designed so that scheduled preventive maintenance services must not be conducted more frequently than annually without adversely impacting the stated system reliability requirements.

Rationale: Reducing the required frequency of scheduled preventive maintenance services will increase commander flexibility while deployed and reduce the logistics footprint, time, and costs associated with maintenance at home station.

Oil and Lubricants. Single fluid shall be used for all lubrication and hydraulic applications. All fluid analysis, if required, shall be performed on system with the result provided to the interface of the maintenance system.

Rationale: The need for a single fluid for lubrication and hydraulic applications is dictated by the requirement to reduce numbers of types of fluid on the battlefield. This consolidation of fluids will have a significant impact on the logistics support requirements of the OF. An on-system analysis capability is needed to ensure real-time information on the status of the lubricant system is available to the UA maintenance system. This will reduce or prevent damage of the vehicle as a result of lubricant contamination or degradation.

If the FTTS-MSV incorporates a fuel burning engine, it shall operate on JP8 and any standard Diesel fuels dispensed using standard Army refueling systems for wheeled vehicles. Additionally, the FTTS-MSV shall be capable of operating on fuels used by the FCS.

. **Rationale:** JP8 has been identified as the Department of Defense (DOD) standard fuel. The use of any standard Diesel fuel as well as those fuels used by the FCS will ensure the FTTS-MSV will have the capability to remain operational

in areas where fuel supplies are limited to what is available on hand.

Prognostics & Diagnostics. The FTTS must incorporate an embedded prognostic and embedded diagnostics system that identifies and displays fault data to the individual component / LRU / LRM level. Both prognostics and diagnostics must provide the level of detection and or isolation required to meet the stated reliability and maintainability requirements. In order to provide maximum coverage of critical failures, the embedded prognostics capability will supplement, as appropriate for the critical components and their failure modes, precursor-based prognostics with prognostics based on component life and stress-histories.

Prognostics: All FTTS platforms/modules will incorporate an embedded prognostics capability that will accurately predict pending critical system failures (any failures that cause system aborts IAW the reliability definition) to the appropriate LRU (LRU defined as any part or component replaceable by field maintenance personnel) that might occur in a 72 hour mission, early enough to allow corrective action before the unit begins the mission. Prognostics will provide coverage for 45% SA and 35% EFF at a 90% accuracy rate (threshold) 70%SA and 65% EFF at a 99% accuracy rate (objective).

Rationale: A reliable embedded prognostics and diagnostics system will provide accurate and timely information to the crew and maintenance personnel. This is a primary enabler for the crew chief to be able to do the majority of the on-system maintenance tasks. Prognostics are a combat effectiveness enabler and not a logistics enabler. The contribution of the prognostics system is dependent upon the coverage, accuracy, and lead-time of the applied sensors. Prognostics will provide increased system health awareness and enable increased combat effectiveness by reducing the risk of unexpected critical failures during a mission pulse. However, mis-prognosis does lead to unnecessary maintenance actions and therefore, contributes to the requirement for a larger than necessary logistics footprint. For that reason, reliable and accurate prognostics are critical.

Diagnostics: All FTTS platforms/modules will incorporate an embedded diagnostics capability that will identify the system failures accurately to the appropriate LRU (LRU being defined as any card, module or component replaceable by field maintenance personnel), with notification first to the crew, then to the supporting maintenance personnel (through the logistics STAMIS) The Diagnostic Sensor Suite will provide 95% coverage and < 3% error rate (Threshold) 99% coverage and < 2% error rate (Objective).

Rationale: Diagnostics is both a combat effectiveness and logistics enabler. The value of diagnostics is a function of coverage and accuracy. Diagnostics will reduce the time required of the crew chief and/or maintainers to identify and isolate a fault, which will enable the proper maintenance action to occur more

quickly. Mis-diagnosis, like a mis-prognosis, will lead to an unnecessary maintenance action and adversely impact logistics footprint. The FTTS maintenance concept, with a heavy reliance on "replace forward" by the operator or CRT, requires accurate and timely troubleshooting of system failures and reduction in the removal and replacement of incorrect components. Prognostics and diagnostics values will be developed based on future modeling of technological maturity estimates.

FTTS MSV must incorporate an embedded mission readiness system. This system will monitor the status of mission-critical components/subsystems (including the crew) and consumables. If a condition is detected that degrades mission capability, the embedded system will determine what action (repair, resupply, crew rest period, etc.) is required to restore full mission capability. The embedded mission readiness system will interface with the crew operationg station and the C4ISR system to provide required status reports and alerts IAW reporting criteria set by the operational commander. The embedded readiness system will include the capability to forecast the future state of the FTTS system on which it is located. It will forecast equipment degradation/failure using prognostics algorithms and data from embedded sensors and operating maintenance logs.

Rationale: Permits sustainment of forces with supplies they need, when they need them. Also facilitates cross leveling of supplies when required. Commanders at all levels must be provided simply displayed but comprehensive pictures of their sustainment status. This information must be tailorable to display all or a portion of the COP as relevant to the various echelons and functions. Threshold information may use current sustainment categories as metrics, collating data passed up from platform level. This requirement is key to the reduction of mechanics and the logistics footprint of the UA as well as enabling the pulse logistics concept. Embedded diagnostics and prognostics on platforms will reduce demand and minimize the maneuver sustainment burden on unit effectiveness. Enables mission staging to rapidly execute sustainment transitions with reduced logistics footprint.

Interrogation Capabilities. The FTTS will have vehicle-to-vehicle diagnostics interrogation capabilities enabling the operator and/or Combat Repair Team (CRT) to diagnose vehicle failures without reliance on external TMDE.

Rationale: By providing vehicle-to-vehicle back-up diagnostics capability, portable TMDE within the UA can potentially eliminated. This capability allows vehicle diagnostics to be performed on non-operational vehicles.

System Maintainability. Though it is expected that the FTTS will achieve high levels of reliability, there will still be unscheduled failures and the need for scheduled maintenance. Maintainability requirements ensure that the required

man-hours and clock-hours necessary to return the system to service are not excessive, thereby allowing the system to be more readily mission capable. FTTS platform designs should integrate pit stop-like efficiencies for repairing failed systems with an ultimate goal of rapid return to combat capability. FTTS platforms shall achieve the following minimum maintainability benchmarks:

- Platform operator must be able to repair/replace at least 60% of SA, 60% EFF, and 60% of NEFF unscheduled field maintenance requirements.
- Mean time to repair (MTTR) must not exceed 0.5 hours.
- Maximum time to repair (MaxTTR) for operator correctable faults must not exceed 0.5 hours
- Each FTTS platform/module shall contain the capability to perform automated Preventive Maintenance Checks (PMC) Total time expended on PMC will not exceed ten minutes to include non automated checks.

Rationale: In order to meet combat power requirements for the FTTS, it is imperative that systems are able to achieve assured mission reliability.

FTTS-MSV systems shall be designed to allow crews to perform on-site repairs. 60% of all LRUs replaced by operator maintainer.

Rationale: Within the envisioned force structure, a significant percentage of repair actions will be performed at operator level. In order for the operator and limited organic support assets to be able to sustain the force, FTTS-MSV systems must be designed to minimize inherent repair time demands.

The FTTS will require no more than 10 common tools on board and 10 additional common tools on the FTTS-MSV Wrecker to perform all field level tasks. These tools will be identical to the twenty tools used to perform all Field Level tasks on the FSC FoS. There will be no special tools required for field level maintenance.

Rationale: Reduces number of tools within the UA/UE, thus reducing the logistics footprint

Interactive Electronic Technical Manuals (IETM). Each FTTS Manned System must have an on-board, full IETM capability that includes operator and maintainer technical manuals (TMs) and Repair Parts and Special Tool Lists (RPSTL) for all onboard equipment, including GFE items (Threshold/Objective). The embedded virtual full task trainer will be fielded concurrently with the FTTS. All technical manuals must be Class 5 or higher, Interactive Electronic Technical Manuals, and include an embedded training to assist the mechanic/operator in performing maintenance tasks and diagnosis.

Rationale: DoD Directive 1430.13 states that the acquisition of a training system that supports a new defense system or piece of equipment shall be

assigned the same priority as that of the parent defense system or equipment. It further stipulates that the device should be available in time for the fielding of the parent system. A 2 Oct 02 SAAL-RP memo, subject: Fielding Systems with Complete Training and/or Unit Support Systems reiterates the importance of the Army's complying with this policy.

I.E.T.M Embedded Video Maintenance Support. The FTTS IETM software platform will allow the operator/maintainer to view actual video coverage on all Field Level Maintenance Tasks. The operator/maintainer will use the IETM for standard maintenance fault isolation tasks, on-system video maintenance task demonstration, and on-system video instructional or refresher training. The IETM will have a multi option capability allowing the maintainer to access various tasks and use links to access video instructions/demonstrations for the task. The video function must allow start, stop, pause, rewind, fast forward, and return to the maintenance window. This will allow the maintainer the option of viewing a maintenance task on video and returning to the maintenance procedures to begin the task. The video will be formatted using memory reduced compression, and can be viewed through a high quality resolution screen.

Rationale: This is the primary enabler for the operator/maintainer requirement supporting OF force structure. A comprehensive replacement instruction media will assist in timely Field Maintenance by providing the operator/maintainer a capability to reference and view all Field Maintenance replacement tasks using instructional video coverage.

Power

Each FTTS-MSV shall provide an on-board power recharging capability for each soldier’s associated systems. (Threshold/Objective).

Rationale: This capability is needed to support ancillary systems that perform their function away from the vehicle and return for recharging. Improve both strategic responsiveness and core warfighting abilities to the effectively fight as an integral component of a joint, interdependent, full spectrum, mission-tailored force by optimizing combat effectiveness via consumption reduction, alternative generation, management, and distribution of power and energy across the force for all systems: motive, electrical, and soldier.

FTTS-MSV environmental control units (heating and air conditioning) shall employ high efficiency systems utilizing power management.

Rationale: Electronic systems within the FTTS-MSV will require an operational environment conducive to efficient operation. Additionally, crew comfort will allow for safer operation of the vehicle over long periods. Because these systems are normally a power drain on the system, they must be efficient.

The FTTS-MSV shall minimize the maintenance, hazardous waste costs, and storage requirements associated with conventional electrical power storage devices. (i.e. Batteries)

Rationale: Reduces O&S costs and hazardous waste

The power storage for the starting system shall be maintenance free.

Rationale: Reduces O&S costs.

Supply

The FTTS must automatically collect critical sustainment data and have the capability to report sustainment data automatically through secure means, or upon request

Rationale: Commanders at all levels must be provided simply displayed but comprehensive pictures of their sustainment status. This information must be tailorable to display all or a portion of the COP as relevant to the various echelons and functions. Information may use current sustainment categories (operational availability by type platform, classes of supply, etc.) as metrics, collating data passed up from platform level. Embedded diagnostics and prognostics on soldiers and platforms will reduce demand and minimize the maneuver sustainment burden on unit effectiveness. Enables mission staging to rapidly execute sustainment transitions with reduced logistics footprint.

FTTS-MSV shall have the capability to quickly cross level supplies i.e. fuel, water, rations, ammunition, etc. between platforms (FTTS to FTTS and FTTS to FCS) inside the UA.

Rationale: Rapid cross leveling capability helps reduce the number of resupply vehicles needed to sustain the force. This capability also improves crew survivability by minimizing their exposure to enemy observation and fire during resupply operations.

Training

Any manned FTTS-MSV platform must be capable of acting in a training mode using embedded virtual training.

Rationale: Virtual, training allows soldier-operators that are not part of the training audience to initialize exercises, control the supporting, opposing, neutral and non-governmental agency semi-automated forces (SAF), and facilitate After Action Review preparations.

A Training Management System (i.e., Standard Army Training System or a derivative) must be part of the embedded training system.

Rationale: The training management function cannot be suspended during UA deployments.

FTTS-MSV training and training support systems must be backed up by a funded Life Cycle Training Support System that can respond quickly to mission and system related changes. System will have open architecture, and be reprogrammable.

Rationale: Embedded training systems cannot be physically separated from its platform and therefore must be sustained as part of the FTTS-MSV Life Cycle Support System.

Training software products will be compliant with appropriate standards, such as the Joint Tactical Architecture - Army (JTA-A), the Army Training Information Architecture (ATIA), the Common Training Instrumentation Architecture, and the High Level Architecture (HLA).

Rationale: These common standards enable the development of reusable training software application product-lines that will facilitate dynamic updates, minimize software maintenance costs, facilitate interoperability, and conserve Army resources.

FTTS-MSV platforms shall have an embedded enroute mission planning and rehearsal system (EMPRS) with the following capabilities - provide world-wide communications and hardware/software applications sufficient to support collaborative planning functions such as chat, file transfer, white boarding, and teleconferencing between enroots, in-theater and in-CONUS commanders - support development of a Training Support Package (TSP) for virtual distributed collective training - produce simulation initialization files, produce a set of After Action Review aides reflecting scenario planning factors (e.g., task organization, mission, concept of operation, operational graphics) - be capable of preparing and displaying non-traditional operational graphics representing the UofA Patterns of Operations.

Rationale: Embedded training requires semi-automated forces, to surround the training audience with adjacent, supporting, opposing and neutral forces that, collectively form the combined arms training environment.

C4ISR dynamic addressing capability must operate uninterrupted in the training and mission rehearsal modes while simultaneously supporting ongoing military operations.

Rationale: Training exercises will normally involve one or more units within the Unit of Action. Training exercises and real operational missions will require a separate address lists.

All operator and maintainer training documents must be delivered in a standard format that must include identification of the structure or subcomponents of the technical manual to facilitate sharing of the material between functional groups.

Must be integrated into the training IETM and on-board database with backup available in a separate format.

Rationale: UA soldiers must be multi-faceted, adaptive and self aware-knowing how to perform more tasks and because sustainment in the first 72 hours of a deployment on a non-linear battlefield will be limited, they must be able to maintain their systems, often with knowledge obtained from knowledge repositories over the C4ISR system.

Embedded Training

Embedded Training will be inherent in FTTS-MSV design and should take on two roles. It can serve as a delivery mechanism for Interactive Multimedia (IMI) and other computer based training. It will also serve as a means to embed the IETM (Interactive Electronic Technical Manual).

Rationale: The communications capabilities in the FTTS-MS will support downloads of training content that can be delivered to the soldier in the vehicle. Embedded training devices should complement the user interfaces existing in the vehicle, but should not duplicate controls found inside the vehicle.

Interoperability TBD

Information Exchange Requirements (IER).

The FTTS-MSV must communicate and transfer data through an organic electronic vehicle/asset tracking system compatible with C4I systems used by the FCS. Vehicle logistic tracking system shall be in accordance with the Information Dissemination Management (IDM) and/or the Global Information Grid (GIG) Capstone Requirements Documents (CRDs) as applicable.

Rationale: The FTTS will be part of the CROP. In order for the operator to send/receive data, the FTTS must have the same compatability to view the CROP as the combat units.

The FTTS-MSV shall comply with the most current version of the Joint Technical Architecture (JTA).

Rationale: TBD

Logistics and Readiness

Logistics.

The FTTS-MSV must be supported by the Army two level maintenance system and standard Army log systems. The FTTS-MSV shall be supported logistically by both military and contract personnel using the most cost effective means available during peacetime with acceptable risk when transitioning to wartime.

The FTTS-MSV shall have built in test/built in test equipment (BIT/BITE) (to encompass TMDE) and embedded diagnostics and prognosticswith Interactive Electronic Technical Manual (ITEM) capability.

Rationale: The FTTS-MSV will operate in austere environments. Operators must have the capability to perform PMC, diagnosis, and repair mission essential equipment.

The system shall withstand corrosion when aboard pre-positioned afloat vessels deployed using ships or stationed inb high salt air environment. When stored, the FTTS-MSV shall be maintained so that it is readily available for deployment.

Rationale: The FTTS-MSV may be pre-positioned to meet ASMP time requirements. The FTTS-MSV must be maintained in a sufficiently robust manner so as to avoid operational delays.

Reliability, Availability, and Maintainability Objectives. The FTTS-MSV must have a level of reliability that will ensure that the system will not fail under mission profiles.

Rationale: TBD

Reliability To achieve high levels of system readiness and pulsed reliability, FTTS platforms must surpass legacy combat system reliability. Reliability requirements are established to provide measurable system benchmarks that establish equipment design parameters and drive platform subsystem/component reliabilities. FTTS platforms must achieve the following system (Total mission package, including GFE) reliability benchmarks.

Mean Time Between System Abort (MTBSA): (failures that deadline a platform, result in unsafe operation, or make it non-mission capable): MTBSA for a 72 hour, high OPTEMPO mission pulse must be greater than or equal to 2800 hours

Mean Time between Essential Function Failure (MTBEFF) is failure that results in system degradation. The MTBEFF for a 72 hour, high OPTEMPO mission pulse must be greater than or equal to 675 hours (Current complex systems have demonstrated a ratio of 4 EFFs for each SA.)

Mean Time Between System Abort –Mobility (MTBSA-M) failures are those that affect a platform's mobility system, resulting in unsafe operation, or making it non-combat capable. MTBSA-M for a 72 hour, high OPTEMPO mission pulse must be greater than or equal to 6450 hours.

ESOH and Other System Characteristics

Annex A

Cargo Variant.

An FTTS-MSV cargo variant shall be capable of operating in garrison and field environments and safely self-loading, securing, transporting, and self-unloading the following cargos at the following payloads:

	Unimproved Roads	
Cargo	Threshold	Objective
Standardized Containers Up To 20 Feet [a]	11 Tons	11 Tons
Family Of Flatracks [b]	11 Tons	11 Tons
Break Bulk Cargo [b]	11 Tons	11 Tons

[a] Any combination of standardized containers up to a twenty (20) foot Equivalent Unit (TEU) (ISO, PALCONS, SIXCONS, QUADCONS, MCESS and ASLMS)(Payload does include the weight of the container)

[b] Payload does not include the weight of the flatrack and assumes 16.5 tons is maximum load permitted by the flatrack.

Rationale: TBD

Speed: The FTTS-MSV cargo variant at improved surface GCW shall be capable of sustaining speeds for over the road movement on public highways at posted speeds.

Rationale: TBD

Storage.

The tool storage capacity shall be sufficient to provide secure storage for all required collateral and on-vehicle equipment as well as tool kits.

Rationale: The ability to carry tools and critical repair parts on-board is essential to quickly repairing platforms to ensure high mission readiness.

Access to storage from the exterior will be unhindered

Rationale: Tools and accessories must be readily available for crew usage as needed.

Cargo Tie-Down Provisions. The FTTS-MSV shall have cargo tie-down provisions in the cargo area that meet military standard requirements and shall be certified to transport ammunition.

Rationale. For safety of personnel and cargo inside the vehicle, equipment must be capable of being secured (tied down or strapped) to prevent movement or shifting during vehicle operation.

Load Towing Characteristics.

Towing Capacity. At GCW, the FTTS-MSV shall be capable of pintle towing a trailer with a payload up to _TBD_ tons (threshold) on unimproved roads, _TBD___ tons (objective) on improved roads. The FTTS (Truck and trailer) must be compatible with as a minimum the HEMMT-LHS and the PLS trailer.

Rationale: The ability to pull / tow trailers other than the FTTS trailer greatly enhances the FTTS' overall capability. In addition, by making the FTTS trailer compatible with the HEMTT LHS and PLS enhances the movement of cargo and equipment. The goal of seamless distribution across the battlefield requires compatibility with current systems.

Companion Trailer Towing. The FTTS-MSV shall be capable of safely towing, over the FTTS-MSV OMS/MP, the FTTS-MSV companion trailer described below.

Rationale: The FTTS-MSV needs to be able to safely tow the companion trailer to ensure all UA systems using an FTTS-MSV trailer as an Associated Support Item of Equipment (ASIOE) can be relocated on the future battlefield.

Backward Compatibility. The FTTS-MSV shall be able to safely tow, over the FTTS-MSV OMS/MP, all systems currently towed by the HEMTT Family. Achieved speeds of the FTTS-MSV and towed system combination shall be equal to or greater than those achieved by the HEMTT and the same towed system.

The FTTS-MSV must be backward compatible with the existing vehicle towed loads to ensure all mission-required equipment will be adequately supported on the future battlefield

Towed Load Brake Control. The FTTS-MSV shall have the capability for positive control of towed system brakes.

Rationale: Future military trailers/towed weapons systems may have positive braking systems that operate in both directions. This requirement will ensure future compatibility.

Towed Load Power and Control. When applicable, the FTTS-MSV shall be capable of providing power and active control of the towed load.

Rationale: Future military trailers/towed weapons systems may have integral motors that provide enhanced off-road mobility. This requirement will ensure compatibility with this type system.

The FTTS-MSV shall be capable of self loading, off-loading, and configuring LHS payloads within 5 minutes. Self Loading/Off loading time begins from the time the lift arm is engaged to the time the LHS payload is at its intended destination point (i.e. on the truck and/or trailer, on the ground, in/out of a container onto the truck and/or trailer, in/out of an aircraft onto the truck and/or trailer, etc…)

Rationale: LHS operations doctrinally increase efficiency in the distribution pipeline and currently take 5 minutes or less to load/unload LHS payloads. This efficiency must be retained to ensure effectiveness of on time on target delivery to Objective Force units. .

The FTTS-MSV and its companion trailer shall directly load/off load cargo laden or empty Modular Platform Systems (MPS)/pallets to/from aircraft and to/from the TSV without additional interfaces and/or materials handling equipment (including other services' equipment).

Rationale: Material handling equipment increases the logistic footprint and increases the transportation assets required to move the force.

The FTTS_MSV shall move containers up to the allowable handling capacity of the lift system within the TSV cargo hold.

Rationale: Containers may need to be repositioned in transit.

Versatility

FTTS-MSV shall receive, re-configure, and distribute Mission and Unit Configured Loads (MCL/UCL).

Rationale: Reduces sustainment footprint and speeds re-supply

FTTS-MSV shall rearm fighting platforms through a common hatch configuration.

Rationale: Enable mechanical handling of resupply reducing manual handling of ammunition.

FTTS-MSV and its companion trailer shall receive and retrograde empty flatracks and configured loads of excess supplies and repairable parts.

Rationale: The FTTS-MSV and its companion trailer will be used as part of the reverse distribution pipeline to retrograde excess supplies and repairable parts. Excess supplies will then be returned to the supply system. Parts will be directed to a maintenance facility for repairs, then returned to inventory or evacuated back to CONUS

FTTS-MSV shall have the capability to employ Automated Identification Technology (AIT) to provide strategic, operational, and tactical logistics systems with the vehicle data needed to enhance the Army's ability to request, receive, redirect, track, distribute, control and retrograde within the integrated distribution system.

Rationale: AIT is an enable that permits cross-leveling of supplies thereby reducing materiel sustainment, equipment, personnel, facilities, and services requirements.

The FTTS Fuel Tank Module must be capable of open port refueling and be compatible with the FCS refueling system, incorporating a locking fast-refueling capability and the capability to draw fuel from a fuel cell. FTTS must be interoperable with legacy and interim systems.

Rationale: The time required to refuel systems must be kept to an absolute minimum. This capability allows for complete refueling of a vehicle with multiple fuel tanks from a single port. Open-port refueling is required when pressure system is not available or when fuel is transferred from one system to another.

Enable FTTS-MSV operators to meet a productivity cycle standard for self-loading/unloading, transferring and securing one (1) modular platform, CROP, PLS flatrack or 40 inch by 48 inch pallets mounted on a trailer, semi trailer, or modular platform. [T] Average standard cycle time is 3 minutes [T] per modular platform, CROP, PLS flatrack or one pallet [O] is 2 minutes per modular platform, CROP, PLS flatrack or pallet These operations will be performed meeting the following criteria:

a. Establish the proper center of gravity for movement.

b. Unload selected module, modular platform or pallet.

c. Reconfigure the remaining load to maintain the proper center of gravity.

d. Secure load for movement.

Rationale: The UA operational concept calls for rapid resupply and the tactical relocation of maneuver forces throughout the battle space. US Army Transportation School has established three (3) minutes as the work standard for handling pallets and containers on all terrain surfaces. This standard is mission performance based on: TOE Section I mission workloads; for aircraft load/unload times and meeting unit time-phased force and deployment list (TPFDL) departure/arrival times;

The Intelligent Load Handling System (ILHS) must operate as a dual function of the modular platform self load arm. ILHS shall have the agility and range of motion to pick up and transport pallets that are stacked unevenly on unimproved terrain or positioned in or on itself and various modes of transport. The ILHS will

load modular containers and platforms on the FTTS as well as configure modular packaged loads on platforms.

Rationale: Leverage pre-configuration packaging and platform-embedded material handling and lift for rapid, accurate and agile resupply that minimizes demand on soldiers. This contributes to eliminating material handling equipment in the battlespace and facilitates conduct of Sustainment Replenishment operations.

Lift Arm. The vehicle-installed robotic lift arm must be capable of loading/unloading a 13 ton load under the following conditions:

From/down to payload base one foot below ground level.

Rationale: System will be used in a field environment and may be required to load or unload system in rough terrain.

From/onto uneven ground slope of five degree (threshold), with ten degrees (objective), from the prime mover's lateral and horizontal axes.

Rationale: System will be used in a field environment and may be required to load or unload system in rough terrain.

Overload. A safety allowance that meets industry standards for overload will be incorporated into the FTTS-MSV hydraulic lifting system.

Rationale: Safety requirement

Approach Angle. The FTTS-MSV ILHS system shall be able to attach to a payload from an approach angle of 10 degrees (threshold), 20 degrees (objective), from the vehicle center line and load and secure the payload to the prime mover. Threshold: 10 degrees Objective: 20 degrees

Rationale: System will be used in a field environment and may be required to load or unload system in rough terrain

Securing Load.. International Standards Organization (ISO) Locks. Cargo variants shall accommodate ISO locking device-equipped cargo containers

Rationale: . To properly secure the load.

Modular Platform System. The modular platform shall be the primary distribution platform. It shall split into sections that can be loaded and distributed individually. System will facilitate connection of the sections without the use of additional MHE to form a single "CROP-like" platform. As such it will retain the capabilities and characteristics of that intermodal platform. In addition the Modular Platform shall load directly onto any aircraft, be sufficiently secured with restraint rails on 463L equipped aircraft for air transport, and be capable of incorporating Automated Identification Technology devices to track the platform and its contents. In both the split mode and as an entire platform, the Modular

Platform shall be capable of being sling loaded or airdropped without damage to the platform or its payload.

Rationale: The modular design allows delivery of loads commensurate with demands. The platform must be interoperable with commercial and military modes of transfer and transport to include NATO standards. DoD standards require lock-in for aircraft rails and tiedowns for safe transport without time-consuming preparations. AIT provides asset tracking of the payload and recovery/management of the platforms. The UA O&O Plan and Concept for Maneuver Sustainment Operations states an increased reliance on aerial delivery to match the expected operational tempo.

FTTS-MSV modular platforms shall have the following characteristics:

Payload weight capacity. The modular platform and secured payload shall have a maximum gross weight of 13 tons. The platform shall be capable of carrying 11 tons (Threshold), 12 tons (Objective).

Rationale: The maximum gross weight of 13 tons meets the 16.5 ton payload restriction agreed upon between the U.S., UK, and GE Armies for demountable cargo beds. Additionally, it allows the HEMTT-LHS to carry the platform. The 11 ton payload is required for current ammunition configured loads.

Container Compatibility. When empty and/or fully loaded, shall be capable of being inserted into, transported, and extracted from ISO 8x8x20-foot end opening containers (Threshold), two empty and/or fully loaded modular platforms per 8x8x40-foot ISO single-end-opening container (Objective).

Rationale: Objective Force distribution concepts call for a seamless intermodal distribution system from factory to foxhole. ISO containers will continue to be used for strategic distribution, while modular platforms will be used for tactical distribution. The ability to place a fully loaded modular platform inside an 8x8x20-foot ISO container is needed eliminate the seam between these two systems and to facilitate configured load delivery to unit level. The Objective of transporting two loaded modular platforms in an 8x8x40-foot ISO container increases flexibility of shipping lightweight cargo other than ammunition while maximizing available transport capability. Additionally, the use of 40-foot containers reduces the ship loading and unloading times, thus increasing supply velocity.

Container/Modular platform Interface. During insertion, transport, and extraction of the modular platform, no damage shall occur to the ISO container to the point where the container no longer meets ISO 1496-1 standards. Means shall be provided which eases the insertion/extraction of the modular platform into/from the container and prevents damage to the container or modular platform.

Rationale: Needed to prevent damage to the container and modular platform and to preclude the requirement for repainting the edges of the modular platform after each use.

Container Stuffing/Unstuffing. When fully loaded, shall be capable of being extracted from and inserted into an ISO container using the FTTS-MSV, a forklift truck of appropriate capacity, other MHE, HEMMT-LHS, or a PLS truck.

Rationale: Configured loads will arrive on modular platforms in containers. To maximize speed and efficiency of throughput, FTTS-MSV, HEMMT-LHS, or PLS trucks will extract platforms directly from containers to transport them to users or SSAs. In some locations at the UE level, forklift trucks or other MHE may be needed for inserting/extracting modular platforms into/from containers.

Payload Types. The modular platform shall be capable of transporting all Army equipment and supplies (within the payload, bed dimensions, and center of gravity limitations) which, when loaded on the FTTS-MSV, does not cause an unsafe condition to the vehicle.

Rationale: The modular platform is the cargo bed of the FTTS-MSV; as such, it must be able to safely transport any load reasonably expected of the vehicle.

Container Restraint System. A fully loaded modular platform shall be capable of being positioned, secured, and transported within an 8x20-foot ISO container throughout commercial and military distribution networks to include ammunition transportability and rail hump testing. An automatic or manual locking mechanism is required such that when the modular platform is inserted into the container, the locking devices shall automatically position or can be manually positioned to complete securing the modular platform in the container. If a manual system is used, it shall require no more than 5 minutes for one soldier to secure the modular platform for shipment or release the modular platform for removal from the container. No uncaptured tools shall be required for this operation. The restraint system shall restrain the modular platform to a maximum of ½-inch movement laterally, longitudinally, and vertically.

Rationale: A self-contained restraint system to secure the modular platform in the container is needed to provide one of the modular platform advantages, which is to eliminate the need for separate dunnage to secure a load of cargo in an ISO container during transport throughout the container transport network, thus reducing cargo stowage and discharge time and manpower.

Stackable Empty. Modular platforms shall be stackable with A-Frame end(s) folded down. Each modular platform shall have integral locking devices to permit stacking six high (Threshold), stacking to a total of 26,000 pounds total weight or dimensional limits of an 8x8x20-foot ISO container, which ever comes first (O).

Stacked empty modular platforms shall be capable of being inserted by appropriate forklift truck, MHE, PLS, HEMTT-LHS or FTTS-MSV as a unit into an ISO container and secured for intermodal shipment.

Rationale: This feature is needed to optimize shipping and storage space for empty modular platforms. Transporting stacks of six empty modular platforms coupled with the capability to insert stacks into containers provides the ability to rapidly and safely move empty modular platforms anywhere in the strategic or tactical distribution systems. Six modular platforms should be within the payload capacity of the FTTS-MSV.

Smart Tiedown System. The modular platform shall have a load-conforming cargo restraint system so that any load shall be capable of being secured IAW all requirements for air, rail, sea, or highway movement. The system shall allow two (Threshold), one (Objective) operator(s) to secure the load. The system shall enable the load for a complete modular platform at its gross weight and cube to be secured within 15 minutes (Threshold), 8 minutes (Objective).

Rationale: The Smart Tiedown System is required to secure loads for intermodal shipment and to reduce the time and materials necessary to secure loads. The manpower requirement is needed due to the FTTS-MSV crew size. The time requirement is necessary to meet UA concept timeframes for CRO and SRO.

Lift Provisions.

Multipurpose Provisions. The modular platform shall be equipped with multipurpose provisions that meet the requirements of MIL-STD-209 at maximum gross weight.

Rationale: To ensure that the modular platform can be lifted by conventional cranes at depots, ports, and other locations when PLS and forklift trucks are not available, and to ensure that the modular platform can be adequately restrained (to aircraft, flatcars, etc.) when transported outside of a container.

Helicopter Lift. The modular platform, when loaded to 25,000-pound gross modular platform weight and configured for external helicopter transport, shall be able to be lifted as a CH-47D helicopter two-point sling load.

Rationale: Objective Force operations dictate that modular platforms may be delivered or retrieved by helicopter. The 25,000-pound gross modular platform weight is the maximum capacity CH-47D cargo hooks.

Deck End Strength. The non-A-Frame end shall permit occasional loading and unloading of wheeled and tracked vehicles up to the payload of the modular platform, during field operations.

Rationale: One of the missions of the PLS is to provide for retrograde movement of supplies and equipment. Loading such equipment in the field without special MHE must be done over the end of the modular platform.

Corrosion Control. The modular platform shall withstand climatic elements to include salt spray for at least ten years (Threshold), twenty years (Objective), without harmful effect and be treated to resist corrosion, rust, and rot (if wood is used in the construction). Contact between dissimilar metals shall be avoided.

Rationale: This feature is needed to ensure that the modular platform will withstand the effects of the combat environment as well as the effects of long term, open storage. The Objective of twenty years equates to the twenty year life of the PLS.

Forklift Provisions.

Side. The modular platform and its individual sections shall have provisions to permit lifting, when empty or fully loaded, from either side by a forklift truck of appropriate size.

Rationale: This capability is needed in the event the modular platforms are moved, relocated, or loaded onto non-PLS vehicles by forklift truck.

A-Frame End. The entire modular platform A-Frame end shall be designated for "wheelbarrow" lift either loaded or empty by appropriate sizes of forklift trucks.

Rationale: This feature is required to ensure the A-Frame end of the modular platform will accommodate the 6K and larger forklift trucks without damage or deformation when needed to stuff/unstuff either loaded or empty modular platforms into/out of ISO containers.

Air Transport. The modular platform shall be transportable, both empty and with 13-ton maximum gross weight, in C5, C17, and C130 aircraft. The modular platform shall be capable of direct loading using the aircraft floor rollers without 463L pallets. The modular platform shall be capable of being secured by the restraint rails on 463L equipped aircraft.

Rationale: To ensure that the modular platform with normal payload is air transportable.

A vehicle alignment system must enable the FTTS operator to safely and effectively align with modular platforms, containers, Air Force aircraft, trailers, or other trucks for loading, unloading, or trans-loading (Time TBD)

Rationale: A vehicle alignment system enables the FTTS to quickly align (eliminating necessity for a ground guide) with modular platforms, containers, Air Force aircraft, trailers, or other trucks for loading, unloading, or trans-loading. Source of requirement is TRADOC Pamphlet 525-4-0, para 4-4.3 b (1), dated 20

1768 Sep 02 Subject: UA Army Concept for Maneuver Sustainment Operations in
1769 Support of the Objective Force

ANNEX B Wrecker

FTTS-MRV (Maintenance Recovery Variant) will possess the following characteristics in addition to the basic vehicle requirements

An FTTS-MSV wrecker variant shall be capable of towing the heaviest FTTS platform /module with its full payload and sustaining the following:

Road Surface	Grade (%)	RMS Roughness (inches)	Speed (MPH) (Threshold)	Speed (MPH) (Objective)
Paved	0	0.1	45	55
Paved	2	0.1	25	35
Paved	3	0.1	20	NA
Gravel	0	0.7	25	NA
Unimproved	0	1.5	10	NA
Unimproved	0	2	5	NA

Rationale: TBD

The wrecker variant shall be able to lift and tow and flat tow all UA systems and current TWV at GCW front or rear without damage to either the towed or towing vehicles through the full range of the towing vehicle's performance characteristics without restriction,

Rationale: Must have the ability to tow vehicles without damage to either platform.

Wrecker variant shall provide the ability to umbilical the brake system on its towed load.

Rationale: Provide for assisted braking.

The wrecker shall be designed to perform its functions with a crew of two

Rationale: Conservation of assetsTBD

Tool storage capacity shall be sufficient to provide secure storage for all required collateral and on-vehicle equipment (OVE) as well as general mechanics tool kits and BDAR kits. All stowage shall be rainproof and equipped with drain holes. Equipment subject to damage from water that would make it inoperable shall be stored in rainproof stowage above the fording line to avoid requiring

waterproofing storage compartments. Access to storage will be unhindered. Tool storage areas shall be designed to prohibit damage to all contents.

Rationale: Secure and efficient stowage for tools and associated equipment.

A capability to employ power tools to speed recovery / repair operations shall be incorporated in the wrecker variant.

Rationale: Provides capability to rapidly conduct field repairs.

The wrecker shall incorporate the capability to cut both ferrous and non-ferrous metals.

Rationale: Hercules Requirement……TBD

The winch or winches shall be of sufficient capacity to perform up to a double line recovery of 150% of the HGVW of the recovered vehicle.

Rationale: Recovery of the heaviest FTTS variant with its full payload.

The wrecker variant shall incorporate the ability to remove, traverse, and place the heaviest powerpack from all platforms within the UA

Rationale: Provides capability to rapidly conduct field repairs .

The wrecker must possess a capability to po the hydraulic lift system on the FTTS-MSV cargo variant.

Rationale: Capability needed to off-load cargo in the event of failure of the cargo variant's power.

Interactive Electronic Technical Manuals (IETM). Each FTTS MRV must have an on-board, full IETM for all systems in the UA/UE that includes operator and maintainer technical manuals (TMs) and Repair Parts and Special Tool Lists (RPSTL) for all onboard equipment, including GFE items (Threshold/Objective). The embedded virtual full task trainer will be fielded concurrently with the FTTS. All technical manuals must be Class 5 or higher, Interactive Electronic Technical Manuals, and include an embedded training to assist the mechanic/operator in performing maintenance tasks and diagnosis.

Rationale: DoD Directive 1430.13 states that the acquisition of a training system that supports a new defense system or piece of equipment shall be assigned the same priority as that of the parent defense system or equipment. It further stipulates that the device should be available in time for the fielding of the parent system. A 2 Oct 02 SAAL-RP memo, subject: Fielding Systems with Complete Training and/or Unit Support Systems reiterates the importance of the Army's complying with this policy.

ANNEX C 5th Wheel

Fifth Wheel Variant. The MSV (tractor) version shall tow a M870, SLOT, M871, M872 or commercial semi-trailer with up to 40 ST payload.

Rationale: TBD

The FTTS-MSV fifth-wheel variant towing the M870 series trailer at maximum payload on a paved road shall be capable of sustaining speeds for over the road movement on public highways at posted speeds.

ANNEX D Companion Trailer

FTTS-MSV Companion Trailer shall have the following characteristics:

Control. The FTTS-MSV companion trailer should be independently controlled by no more than one operator from within the truck's cab for self deployment missions.

Rationale: The FTTS-MSV trailer may be self deployed to deliver cargo/supplies to combat units to promote expediency in resupply operations.

Tracking. The FTTS-MSV companion trailer shall be designed to ensure proper tracking behind the prime mover.

Rationale: This requirement enhances the safe operational characteristics of both the prime mover and trailer.

Mobility Degradation. While empty or fully loaded, the FTTS-MSV companion trailer shall cause no decrease in the mobility characteristics of the prime mover.

Rationale: This requirement ensures the FTTS-MSV with its companion trailer is able to keep pace with other critical UA systems.

Brakes.

The FTTS-MSV companion trailer shall have a braking system that activates when separated from the prime mover and shall hold the trailer on a 30 percent longitudinal slope (in either direction) when uncoupled.

The operator shall easily disengage this capability in the event the trailer must be moved when uncoupled from the prime mover.

The FTTS-UV companion trailer shall meet current military and federal motor vehicle safety standards, such as FMCSR.

It is necessary that the brake system be designed to allow for safe and effective operation when coupled or uncoupled from the prime mover. A brake system that activates when separated from the prime mover and can hold on a 30 percent slope is needed to allow positioning the trailer on uneven terrain and ramps in Roll-On/Roll-Off (RO/RO) vessels. The operator must disengage the brake system to permit repositioning the trailer when it is not appropriate or required to use the prime mover.

Coupling/Uncoupling. The FTTS-MSV companion trailer shall be capable of being coupled/uncoupled by one soldier and free standing on both hard and soft surfaces when fully loaded and not attached to the prime mover.

Rationale: The prime mover will have a crew of one; therefore, it is essential that only one soldier couple/uncouple the trailer to meet system emplacement demands. The trailer must be free standing when uncoupled to allow for autonomous operation.

Expediency Towing. The FTTS-UV companion trailer shall capable of being safely towed by the pintle of legacy trucks for emergency movement.

Rationale: This requirement is needed to ensure compatibility with legacy prime movers in the event it becomes necessary to tow the trailer with a legacy truck in an emergency situation. It is recognized that such emergency operation may require operation at a reduced performance level.

Backing Truck-Trailer Combination. The FTTS-MSV companion trailer shall be capable of being backed safely from any normal position (such as when in a turn but not from full jackknife) without damage to truck, trailer, or payload, and without necessity for operator dismounting or other preparation.

Rationale: Safe backing of the truck with trailer is imperative to ensure safe operation in both peacetime highway operations and wartime tactical operations. Backing frequently becomes necessary to permit extrication from an untenable situation or to improve a tactical operational position.

Wheels. The FTTS-MSV companion trailer shall have lug nuts, tires and wheels compatible with the FTTS-MSV.

Rationale: This requirement is needed to reduce the logistic burden and to improve operator maintainability of both vehicles. The ability to replace a truck wheel with a wheel from the trailer may mean the difference between returning to the security of the UA or being captured.

Annex E FCS Family of Systems

Each FCS FoS (FTTS-MSV) platform must have an internally operated, self-refueling capability that allows the platform to refuel itself or discharge its internally stored fuel into another FCS platform or fuel storage receptacle within 30 seconds using automated/robotic means. Additionally, each FCS FoS platform must be capable of open port, gravity refueling and be compatible with the FCS refueling system, incorporating a locking fast-refuel capability and the capability to draw fuel from a fuel cell. FTTS must be interoperable with legacy and interim refueling systems. If multiple fuel tanks, complete refueling must be accomplished from a single port.

Rationale: Rapid, efficient resupply of the FTTS under all types of conditions dictates that the system be capable of self-load. Cross-level capability ensures that FTTS/FCS platforms requiring fuel to complete a mission can receive fuel from other platforms. Gravity refuel allows FTTS platforms to use commercial or emergency fuel sources if necessary

Annex F Block items

341 Robotics. FTTS-MSV shall incorporate the ability for each platform to perform the duties of the lead vehicle or an unmanned follower with minimal effort.

Rationale: Personnel savings

The FTTS-MSV platform shall include, for each crewman, one removable Crewman's Wireless Remote Interface System (CWRIS) that can connect to the C4ISR system, wirelessly from within the vicinity of the platform in a secure mode. The CWRIS will be able to operate without recharging for four hours of continuous use. The CWRIS cradle within the FTTS-MSV must provide a recharging capability. The CWRIS will contain the Army's training management system, the Scenario Generation System, Standard Army SAF and an image generation and display capability. It will also be capable of either displaying a duplicate image of the on-board command and control interface or the user interface for reach back training. To communicate effectively with local populations, the CWRIS will have a language translation capability (Text and Voice). The CWRIS, when connected by wire (e.g., Ethernet) to other CRWIS's will be capable of stand-alone, 'desktop', virtual collective training.

Rationale: While the Embedded Training capabilities are enabled for on-vehicle performance, it is unrealistic to require all training and training management functions to be performed on vehicle all the time. Further, some battlefield functions (e.g., maintenance, observation post duties, and interaction with local populations) are performed in the vicinity of the vehicle. A CWRIS is a multi-functional device that will support performance of off-vehicle / near-vehicle battlefield functions while recognizing the peacetime reality of off-vehicle training and training management.