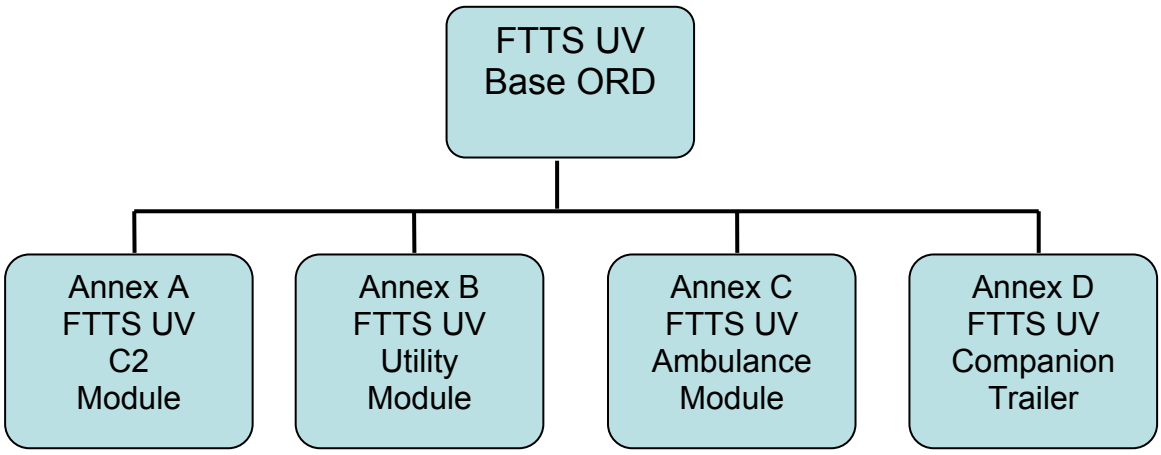
DRAFT

Future Tactical Truck System – Utility Vehicle

FTTS-UV

Emerging Desired Capabilities

In and 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-UV 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-UV 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-UV) 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.

Range The FTTS-UV 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. The FTTS-UV shall be capable of operating for an additional distance of at least 100 statute miles with the additional fuel reserves carried in standard Army containers and transported externally on mounting brackets provided as a kit. Upon arrival, the FTTS-UV must support the UA capability to conduct distributed and continuous 24-hour operations, self-sustained, for a minimum of three days with out requiring reception and staging.

Rationale. The range will ensure that the FTTS-UV has the ability to sustain itself for 72 hours without re-supply in a high intensity battle and another four days in a low intensity environment and maintain momentum with the UA on the battlefield. The fuel container mounting kit enables anyone who needs the additional fuel capacity to have the means to transport it without detracting from

space required by their payload. 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 radius (150 km diameter) and area of interest of 150 km radius (300 km diameter).

Payload. The FTTS-UV shall have a payload of at least 4000 pounds (Threshold) and/or 5000 pounds (Objective) excluding full internal fuel, lubricants, coolants, 2 soldiers (Threshold) (3 soldiers – Objective) and their individual equipment and weapons, and Basic Issue Items (BII).

Rationale. In order to support the Objective Force Mission loads, the FTTS-UV must be capable of transporting required mission weight. Limitations placed upon the space and weight of the systems will thereby ensures no compromise in the soldier space in the TWV.

Crew Compartment.

Primary Crew Seats. The FTTS-UV shall have at least two primary crew seats (Threshold) (three primary crew seats or a bench - Objective), or another variation thereof which provides equivalent required seating. This seating shall provide ergonomic support 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 three-seat configuration permits transporting the three-soldier communications crew with their shelter 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. This seating shall provide ergonomic support to provide leg, back, shoulder, and head support.

Rationale. Four personnel are required for the command and control function; therefore, seating for at least two additional soldiers is required. The FTTS-UV 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 Safety.

Individual Weapons Stowage. The FTTS-UV 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) (five soldiers – Objective) 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.

Survivable Space. The FTTS-UV shall have a cab design that provides sufficient survivable space during an accident for up to four occupants (T), 5(O) in the primary and secondary-seating areas.

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

Cargo Compartment Seating. A troop seat kit shall be provided to permit transporting at least eight combat equipped soldiers in the cargo compartment. Seats shall permit the soldiers to face inboard as well as outboard based on the tactical situation.

Rationale. The FTTS-UV is required to transport troops in some instances (e.g., in the event of the demise of an FCS Infantry Combat Vehicle (ICV)). Design of the troop seat kit to transport at least eight combat equipped soldiers is needed to enable the FTTS-UV to transport a complete ten-man squad. Tactical situations commonly require that seated soldiers face outboard with their weapons at the ready while being transported by FTTS-UV in the battle zone.

Occupant Accommodations.

Operating Environment.

Crew Compartment Operating Environment. The FTTS-UV 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-UV 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-UV 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-UV 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.

Cargo Compartment Operating Environment. The FTTS-UV cargo compartment shall have internal environmental control for personnel working in vehicle for extended periods of time. (A kit may be used to meet this requirement. If a kit is used, it shall be installed at Field Maintenance level or below.)

Rationale. The FTTS-UV will be operated throughout the world as exigencies dictate. The FTTS-UV cargo compartment may routinely be used for troop transport operations in temperature environments ranging from as high as 120 degrees F to as low as -50 degrees F. Prolonged exposure to these temperatures can cause extreme fatigue and or permanent physical injury. The FTTS-UV must allow for safe and comfortable sustained operations in daylight and darkness and while the troops in the cargo compartment are wearing MOPP IV gear (10 hours of continuous operation) to ensure that soldiers riding in the cargo compartment of the FTTS-UV remain mission capable. Use of a kit to provide a safe and comfortable cargo compartment for troop transport may be more cost effective than equipping all vehicles with this capability from the factory.

Vehicle Control Enhancement (VCE). The FTTS-UV 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-UV 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 enhancement provides for safer operation of the vehicle when operated closer to the design limits of the FTTS-UV. 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-UV 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-UV; therefore, the vehicle must not exhibit any unusual or unsafe characteristics.

Crew Restraint System. Each occupant seat (seats in the primary and secondary seating areas but excluding troop seats and ambulance kits) shall have modern integrated safety restraint equipment, active/passive, 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 and shall provide quick release egression from the vehicle in emergency or contingent situations. In addition, he restraint system shall also not interfere with the active and passive VCE.

Rationale. The stated requirements provide for the required Federal level of safety as well as enhance operator control of the vehicle across the expected terrain profile. 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.

Vehicle Security. The FTTS-UV 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-UV 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-UV 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-UV shall be capable of safely towing, over the FTTS-UV OMS/MP, the FTTS-UV companion trailer.

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

Backward Compatibility. The FTTS-UV shall be able to safely tow, over the FTTS-UV OMS/MP. Achieved speeds of the FTTS-UV 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-UV must be backward compatible with the existing light vehicle 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-UV performance level to be compatible with the towed load.

Towed Load Brake Control. When applicable, the FTTS-UV 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-UV 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-UV 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 on US Navy and Army watercraft and to provide ease of trailer/howitzer emplacement in field positions, and aircraft relocation on the airfield.

C4I

The FTTS information system must provide all manned systems the ability to integrate into a joint, secure, mission planning and rehearsal system from alert through deployment to employment and connectivity into the gaining command's

C4ISR architectures during movement by air, land and sea. The system must interface with the COP 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. FCS-equipped UA will operate as part of a Joint Team across DOTMLPH. The FCS FoS supports top-level Information Exchange Requirements (IER) detailed in Appendix J of the FCS ORD to enable the exchange of information vertically and horizontally, from alert through deployment and employment, to conduct operations with Joint forces. Given Joint Communications support and bandwidth between JTF, intervening HQ as established, and UA, accomplish 100% IER information exchange (Threshold) with achievement of IER information exchange time standards (Objective).

Systems PMs shall integrate with the Common Relevant Operating Picture (CROP) via embedded C4I equipment on the FTTS-UV to include different types of suites, architectures, network peripherals, subsystems, and radios. The FTTS-UV 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-UV (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.

The FTTS-UV 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-UV must have the same signature management capabilities as the forces it supports.

Deployability.

The FTTS-UV 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 in support of distributed operations. This capability improves not only our entry capability but also the continued flow of forces later in the campaign for decisive operations. Transporting the FTTS-UV and its companion trailer with a maximum payload will decrease the number of trucks and/or supply loads needed to accomplish a mission.

The FTTS-UV 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-UV can not cause combat ineffectiveness due to increased prep time or time due for mission configuration/re-configuration.

The FTTS-UV 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.

Transportabiltiy

The FTTS-UV 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-UV 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-UV 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-UV and companion trailer to use, thereby precluding unnecessary damage while transporting the FTTS-UV and companion trailer.

The FTTS-UV 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 special ramps, blocking or bracing, or other dunnage and without any part of the FTTS-UV or trailer except for the tires touching the ground, ramp or compartment (cargo) area/floor.

Rationale: The FTTS-UV 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-UV vehicle make contact with the C-130's logistics rails.

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

Air.

Fixed Wing Air Transportability. The FTTS-UV shall be air transportable at GCW (without demounting subsystems/shelters) by C-130 and larger aircraft. A minimum of three FTTS-UV vehicles at GVW (without demounting subsystems/ shelters) shall be transportable by C-130 aircraft.

Rationale. The FTTS-UV must be capable of being loaded on C-130 and larger aircraft with its trailer/howitzer to facilitate rapid loading and unloading of the aircraft. A minimum of three FTTS-UV vehicles on a C-130 aircraft is required to ensure no increased air transport is required above that of the current light fleet.

Low Velocity Aerial Delivery (LVAD). The FTTS-UV shall be capable of LVAD (shelter demounted, if applicable) by: 1) C-130 at GVW, excluding crew, without towed load, and 2) C-17 at GVW, excluding crew, with and without towed load. It is the user's Objective that the FTTS-UV plus towed howitzer be capable of LVAD on standard Type 5 airdrop platforms configured to 32-foot length. After a successful LVAD, vehicle shall be ready for operation in 15 minutes (excluding shelter remounting time) (Threshold) (10 minutes or less - Objective), after removal of LVAD rigging.

Rationale: The FTTS-UV must be capable of LVAD in support of rapid deployment forces and airborne operations, especially with the light howitzer. Use of standard type five airdrop platforms configured to 32-foot length eliminates the need to develop a new LVAD platform for this vehicle/howitzer combination. Ready for operation times ensure that the system can clear the drop zone and commence mission operations in a timely fashion.

Rotary Wing Transportability.

CH-47 Aircraft.

External Transport. The FTTS-UV, at GVW (without dismounting subsystems/shelters to include ambulance kits), shall be individually externally transportable (sling-load) by CH-47 at GCW and at GVW in tandem with the towed howitzer at 4,000 feet above sea level and 95 degrees Fahrenheit (F), 30 Nautical Miles (NM) radius of action (Threshold) (60 NM – Objective). Crew, cargo/ammunition shall be loaded in the aircraft up to the payload of the aircraft.

Rationale. Simultaneous external transport enables rapid employment of the FTTS-UV and weapon or trailer towed load and makes more efficient use of

time and transport assets. Rigging procedures designed for this type vehicle should be standard dual point rigging procedures presently employed by the Army today.

Internal Transport. (Objective) The FTTS-UV and its companion trailer, each at GVW, shall be internally transportable by CH-47.

Rationale. Internal transport is required to maximize the operational effectiveness of the light forces and Special Operational Forces (SOF). ***(NOTE for Future Reference: The Infantry School requested this requirement be a Threshold rather than an Objective requirement. Requires additional rationale.***

UH-60 Aircraft.

The FTTS-UV shall be transportable by the latest model of the UH-60 at 4,000 feet pressure altitude and 95 degrees F, 30 NM radius of action (Threshold) (60 NM – Objective) at curb weight with two combat equipped soldiers and two combat net radios (Threshold) (with winch, four combat equipped soldiers, two combat net radios and camouflage netting - Objective).

The FTTS-UV companion trailer shall be transportable by the latest model of the UH-60 at 4,000 feet pressure altitude and 95 degrees F, 30 NM radius of action (Threshold) (60 NM – Objective) at trailer GVW.

Rationale. Helicopter transport provides operational flexibility for the Light Forces. Transport of the FTTS-UV in this configuration by the UH-60 gives the Light Forces the capability of rapid movement of combat assets.

Tilt-Rotor Aircraft (MV-22).

External Transport. At GVW and without demounting subsystems, the FTTS-UV shall be individually externally transportable (either single or dual point sling-load) by MV-22 (with nose gun) at 3,000 feet above sea level cruise altitude, takeoff/landing from sea level, and 91.5 degrees F cruise, for a 100 NM radius of action. Vehicle, crew, and payload may be adjusted so as not to exceed aircraft limit of 8,400 pounds (at 100 NM radius), 10,000 pounds (at 50 NM radius) or 11,600 pounds (ship to ship transfer at less than 1 NM radius).

Internal Transport. (Objective) The FTTS-UV and its companion trailer, each at GVW, shall be internally transportable by MV-22.

Rationale. External transport enables rapid employment of the FTTS-UV and payload and makes more efficient use of time and transport assets. Land Assault-External lift profile is assumed. Ship to Objective Maneuver (STOM) concept currently calls for aircraft to launch from 50 NM out from the shore. If one assumes 50 NM inland transit, this is how the 100 NM radius was derived. The Objective internal transport allows for movement of SOF vehicles.

External Air Transport (EAT) Survivability. The FTTS-UV and its companion trailer shall be designed to withstand, without damage, the forces imposed by the wind at the maximum safe external load airspeed of the CH-47, UH-60, and MV-22 (Threshold) (maximum airspeed of the aircraft - Objective).

Rationale. The pilot should not have to limit the speed of the aircraft because of concern about wind damage to the FTTS-UV or its trailer at the aircraft's maximum external load airspeed.

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

Meet highway legal limits, without waivers or special permits, for all countries in which the FTTS-UV 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-UV.

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-UV 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.

Gradability.

Longitudinal Slopes. The FTTS-UV at GVW (Threshold) (GCW - Objective) shall be capable of ascending/descending, starting, and stopping on dry, hard-surfaced longitudinal slopes up to and including 60 percent. At GCW, the FTTS-UV shall be capable of ascending/descending, starting, and stopping on dry, hard-surfaced longitudinal slopes up to and including 40 percent (Threshold) (60 percent - Objective). At GCW, the FTTS-UV shall be capable of holding in either direction on a 30-percent longitudinal slope (Threshold) (40-percent - Objective) using only the FTTS-UV 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. The engine off times shall be of such long duration as to

assure that there shall be no loss of fluids or other malfunction while parked on the slope.

Rationale. Steep terrain (with slopes up to 60 percent) will be encountered in operational areas around the world. Negotiating these slopes is essential for the emplacement of towed weapons, communications shelter systems, and overall battlefield maneuverability. 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.

Side Slopes. The FTTS-UV and its companion trailer, both at GVW, shall be capable of traversing side slopes 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: With the variety of worldwide deployment locations, operations with side slopes up to 40 percent will be encountered. Negotiating these slopes is essential for overall battlefield maneuverability. It is essential the FTTS-UV and its companion trailer be safe, stable platforms while negotiating these slopes.

Speed on Grade. The FTTS-UV and its companion trailer both at GVW 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.

Fording. The FTTS-UV and its companion trailer both at GVW shall be capable of fording a salt or fresh water obstacle, not less than 40 inches in depth (Threshold) (60 inches in depth – Objective), at speeds of at least 5 mph, without preparation or kits and without any increased after-action maintenance requirements.

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. Maintains the momentum of the force during maneuver by limiting obstacles that require augmented support to negotiate. Fording is required to allow operations where water obstacle crossing and amphibious landings are required. Fresh and salt-water requirements

ensure the vehicles are properly designed to withstand the most vigorous of environmental conditions. The 40 inches (Threshold) (60 inches - Objective) requirement ensures the system can operate in consonance with the FCS. Inability to achieve this capability will result in the fielding of a vehicle that is less capable than the maneuver forces it must support, thus adversely affecting the maneuver commanders ability to maneuver, employ, and control his forces.

Mobility.

Forward Speed. The FTTS-UV at GVW shall be capable of a minimum speed of 75 MPH in the forward direction on a dry, level, hard surface road to provide operational capability to meet mission needs.

Rationale. The FTTS-UV must achieve the performance speed of the fastest predecessor system to ensure no loss of current battlefield mission capability. Currently 1113 has a capability of 72 MPH and the Up-armored HMMWV has capability of 62 MPH.

Acceleration. The FTTS-UV at GVW and on a dry, level, hard surface road shall meet or exceed the acceleration characteristics of the quickest predecessor platform.

Rationale. The FTTS-UV requires sufficient forward acceleration to operate as a light tactical wheeled platform which shall ensure rapid get-away capability under hostile fire situations.

The FTTS-UV at GVW must be capable of a dash speed which is characterized by the ability to accelerate from 0 to 48 kph (30 mph) on level hard terrain within 12 seconds (threshold)/10 seconds (objective). The FTTS-UV will be able to repeat this acceleration at least ten times in succession.

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 missles (ATGMs).

Soft Soil Traversing Characteristics. The FTTS-UV shall have equal or better Mobility Rating Speed (MRS) and percent GO/NO-GO than the FCS or most mobile predecessor tactical wheeled vehicle platform, (TWVP).

Rationale. The FTTS-UV must have sufficient soft soil mobility to keep pace with the FCS in UA operations as well as retaining current survivability characteristics inherent in the mobility of the predecessor TWVP

Vertical Step. The FTTS-UV at GVW shall be capable of climbing, in forward and reverse, a vertical obstacle of 32 inches (Threshold) (40 inches – Objective) in height without preparation of modification of the vehicle.

Rationale. The ability to traverse cross-country areas requires the FTTS-UV to over-ride linear obstacles in its path. These features include boulders, logs, rice paddy dikes, washes, ditches, and other man-made obstacles. This requirement is needed to ensure the FTTS-UV meets the mobility requirements for percent GO/NO-GO as well as allowing it to traverse obstacles crossed by FCS. Attaining the Objective characteristics will improve the mobility of the system increasing its combat effectiveness.

Trench Crossing (Objective). The FTTS-UV shall be capable of navigating obstacles which include the following: gaps >3 meters wide, slopes > 60 percent and vehicle cone index < xx, in addition, manmade obstacles, CBRN obstacles, civilian population obstacles and final protective obstacles.

Rationale. Maintaining momentum on the future battlefield will be a key element to the success or failure of the FCS/UA force. Standoff mine, obstacle, IED, and booby trap detection, identification, characterization and reporting enhances tactical mobility and operational momentum. Obstacles include natural terrain obstacles (gaps >3 meters wide, slopes > 60 percent and vehicle cone index < xx), manmade obstacles, CBRN obstacles, civilian population obstacles and final protective obstacles.

The FTTS-UV 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.

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

Ride Limiting Speed. The FTTS-UV 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-UV 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]).

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-UV shall sustain no more than 2.5-G peak vertical acceleration, as measured at the occupants' location as well as the entire cargo compartment of the FTTS-UV 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.

Influence on Range. FTTS-UV capability 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 as previously stated shall have no impact upon maneuverability or adaptability on the battlefield.

Rationale. Maintaining momentum will be a key element to the success or failure of the FCS/UA force. The FCS FoS must enable the performance of manpower intensive or high risk functions without exposing soldiers directly to hazard. The pace and complexity of operations will increase, thereby making any materiel option which provides maximum protection and maneuverability to the soldier a desirable advantage to the FCS on the battlefield.

Mission Profiles.

Upon entry into the AO, FCS FoS (FTTS-UV) 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: "FTTS-UV 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-UV shall adapt an interoperable method to remain compatible with standard common support equipment for refueling, rearming, resupply, servicing, and material handling.

Rationale: Standardize support equipment

Each FCS FoS (FTTS-UV) 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 re-supply 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

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

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

Each FTTS-UV shall provide an on-board power recharging capability for each soldier's associated systems. (Threshold / Objective). 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-UV 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). Systems must maintain compatibility with Joint Team equipment standards and requirements.

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. Commonality required in accordance with FCS ORD KPP #1.

Rationale: This capability is needed to support ancillary systems that perform functions away from the vehicle and return for recharging. Both strategic responsiveness and core warfighting abilities must effectively be 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-UV environmental control units (heating and air conditioning) shall employ high efficiency systems utilizing power management. 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-UV 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 battery 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. This also ensures reduced O&S costs.

A system or on-board device which permits starting the vehicle when the vehicle batteries lack sufficient power to start the engine, exclusive of the slave starting capability provided by the existing NATO Intervehicle Power Receptacle.

Rationale. This characteristic is needed on vehicles that are routinely required to maintain radio watch to enable starting the vehicle when the batteries are reduced or depleted to the point of being unable to start the vehicle. Once the battery system has been depleted, the crew cannot use their radio system to call for assistance. This capability will allow engine restart and improve chances for mission completion and ensures a get-home capability. A vehicle mounted kit; easily transported, rechargeable device; or other innovative approaches will be considered as possible solutions.

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.

Idle RPM Control. An idle RPM control is required to permit increasing and setting engine idle RPM without using a foot and/or hand throttle to support winch operations and cold weather start procedures. This high RPM control shall operate only when the vehicle is in park or neutral and automatically disengage when the vehicle is placed in gear.

Rationale. High engine idle is required to allow out-of-cab winch operations and out-of-cab operation during cold weather warm-up. The cut-off feature when the vehicle is placed in gear is required to prevent the high idle control from being used as a cruise control.

Ancillary Electronic Equipment. The FTTS-UV 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-UV. 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-UV. 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).

Fuel Access Connection. The FTTS-UV shall have a fuel access connection to allow access to FTTS-UV fuel for power units.

Rationale. The fuel access connection is needed to allow the use of FTTS-UV fuel by power generating units associated with shelters and ambulances. Commonality is a critical performance characteristic.

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. A dimmer switch for instrumentation lighting shall be added for viewing the instruments with the unaided eye while driving with the AN/PVS-14.

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-UV 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. This dimmer switch would allow adjustment of the instrumentation lighting so that it is not visually detectable with unaided vision at a distance no greater than that of the current HMMWV.

Mounting Points. The FTTS-UV 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-UV 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.

Configuration/System Accommodation. The FTTS-UV shall have mounting points and reinforced weapon stations to accommodate the following existing organic systems. Requirements for these configurations can be located in each organic system's operational requirements document.

Contact maintenance truck configurations.

Light howitzer prime mover configuration (See M1097 technical specification).

Large Area Screening System configuration.

TOW missile system configuration.

Rationale. These systems and configurations are currently transported on light vehicle assets and will migrate to the FTTS-UV as it becomes available; therefore, the FTTS-UV design must accommodate them.

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

Rationale: FTTS-UV will be an ammunition distribution vehicle

Power Take Off (PTO): The FTTS-UV shall incorporate PTO on all variants.

Rationale: To operate all auxiliary equipment.

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 ded to enhance flexibility of supply operations, minimize need for special purpose water units and demands, and increases available combat power

Water Dispenser. The FTTS-Variants shall be capable of separately dispensing cold (ambient temperature) and hot (115-120 Degrees F) potable water from the bedded potable water generation system in order to provide drinking water and hydration of compressed rations.

Rationale: Compatibility with new field rations requires hot water for re-hydration enhances soldier quality of life and is in accordance with OSG 40-25, Nutritional Standards and Education for DoD.

Water Cross-Leveling. The FTTS Variants- shall incorporate an internally operated cross-leveling capability to re-distribute water between other FTTS-UV/FCS systems and crews. The FTTS-Variants shall be capable of both dispensing and receiving water during cross-leveling operations and open port gravity fill.

Rationale: Cross-leveling is needed to enhance flexibility of supply operations and increase available combat power. Internal capability minimizes solider exposure and enhances soldier protection while reducing the logistics footprint. Commonality across battlefield is critical.

Captured 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.

Climatic Conditions. The FTTS-UV shall be capable of full operation, transport, and storage in the climatic areas of hot, basic, and cold. A special kit to meet cold area vehicle and crew operations is acceptable. If a kit is used, it shall be installed at Field Maintenance level or below. Specifics are listed below:

The FTTS-UV 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).

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

Rationale. This vehicle is required to operate worldwide in these climatic conditions. Since cold operations are relatively restricted, kits may be used to achieve acceptable vehicle and occupant operations below -25 degrees F.

Shelters. The FTTS-UV shall be capable of carrying the existing S250; Standard Integrated Command Post Shelter (SICPS) S-787; and Lightweight, Multipurpose Shelter S-788. Removal and installation shall be accomplished at organizational level. Emerging and envisioned shelters shall be designed to fit on FTTS-UV without modification to the platform.

Rationale. The ability to accommodate these shelters will allow the FTTS-UV to perform current shelter carrier missions. These shelters are the housing for the existing High Mobility DGM assemblages (TRC-138C, TRC-173B, TRC-

174B, TRC-175B, and MD-6950 HMDA Pallet), STAR-T (T3H), and SMART-T which are currently transported by HMMWV. The ability to remove and install at organizational level allows for reconfiguring of the system to meet the demands of the tactical environment.

Recovery and Evacuation Operations.

Like-Vehicle Towing. The FTTS-UV at GVW shall be capable of towing any other FTTS-UV at GVW (Threshold) (GCW – Objective) over the FTTS-UV mission terrain profile using a standard Army 5-ton wrecker tow bar. Reduced speed of 15 percent for this operation is acceptable.

Rationale. To permit evacuation of one FTTS-UV by another FTTS-UV during periods when standard recovery vehicles are in short supply on the battlefield. The 5-ton wrecker tow bar is the standard tow bar used for towing all vehicles 5 tons and lighter. It is recognized that such emergency operation may require operation at a reduced performance level.

Recovery/Towing. The FTTS-UV shall be capable of being recovered/lift and flat towed from both the front (at GCW) and rear (at GVW) by all wrecker systems, existing and emerging, with no disassembly required.

Rationale. This requirement is needed to ensure the FTTS-UV can be recovered and evacuated by Army wheeled wreckers.

Each FTTS-UV 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.

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

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. These shall preclude damage to vehicle components such as axles, CV joints, bumpers, etc. as well as prevent harm to the operator.

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

- From GVW to GCWR
- by axle

- For terrain conditions

The FTTS-UV 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-UV must have near instantaneous capability to transition from hard surface to soft surface/austere conditions.

Cargo Tie-Down Provisions. The FTTS-UV 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.

Lethality

Tactical Security.

Noise Suppression. The FTTS-UV noise signature shall be no louder than the quietest HMMWV or no greater than the FCS -- whichever is quietest. A kit may be used to provide this capability. If a kit is used, it shall be installed at Field Maintenance level or below, and shall not be counted against payload.

Rationale. The vehicle must be able to operate in or near the enemy's operational area. Noise generated from the FTTS-UV will give away friendly force's location and decrease survivability of personnel and vehicles. The FCS noise level, if quieter than the HMMWV, must be achieved in order to retain tactical security of the organization when operating in the same area as the FCS. A kit may provide this capability, but must not impact upon the payload carried to preclude the commander having to choose between noise suppression and critical mission equipment.

Engine-Off Driving Capability. Selected FTTS-UV versions, without the power unit operating, shall:

Be capable of driving 5 miles cross-country and performing silent watch.

Be capable of driving 20 miles at 35 MPH on a dry, level, hard-surface road.

Rationale. Engine-off driving for short periods of time will enhance tactical survivability and increase fuel economy of the system when both are paramount.

Silent Watch Capability. Selected FTTS-UV versions, without the power unit operating, shall have the capability of sustaining 6 kW hours (Threshold) (9 kW hrs – Objective), of continuous electrical power usage over a 12-hour period.

Rationale. Silent Watch is defined as engine off static vehicle operations where communicating by radio, observing with powered optical systems, and laser range finding takes place. These functions are critical while in combat areas and the noise associated with and fuel consumed by engine starting and running to recharge batteries has always been a shortfall in maintaining tactical security.

Self-Defense Weapons.

Primary. The FTTS-UV 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 5^{th} to 95^{th} 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. 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.

Secondary. There shall be provisions for mounting a second (rear-firing) self-defense weapon station (i.e., M2, M240, M249, M60 Machine Gun, or MK-19 Grenade Machine Gun) with ammunition can (if required) to provide defense to the rear 180 degrees of vehicle, in addition to the primary weapon station. The mount shall have provision to be capable of traversing with little effort from the gunner and without interfering with crew operation. Provision to enable the 5th to 95th percentile target audience soldier to operate the weapon (without interfering with other crew operations) is required. The crew must be able to perform all crew service functions on the weapon while it is mounted at the rear facing  ion. Spent brass and links shall not enter the crew compartment.

Rationale. 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. Due to the limited forward firing arc of the TOW missile system, the secondary gun position is needed to provide protection, early warning, and defense from rear approaching threats. The desired secondary weapons station for other FTTS-UVs also provides protection, early warning, and defense to the rear, which is normally an area not under constant observation. This secondary weapon dramatically improves crew, convoy and unit protection, particularly in close terrain. The weapon must be accessible to accommodate the variety of personnel that will operate the weapon. The requirement for the crew 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.

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. Use of the current gun shield is acceptable. The gun shield shall be removable at the organizational level without special tools.

Rationale. The gun shield significantly enhances survivability for the weapons operator as he engages targets. The existing HMMWV gun shield provides a level of protection sufficient to meet mission requirements. Removal at organizational 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 Military Police mission.

Survivability.

User Interface. The safety, efficiency, and effectiveness of the interface between the FTTS-UV and those who must operate, support, or maintain it are critical to the acceptance and utilitarian value of the system.

Rationale. System efficacy can be no greater than the efficiency and effectiveness of the user (operator, maintainer, support personnel) interface. This is particularly and increasingly true in an environment of rapidly changing and more complex technology wherein, aside from budget; human safety and performance considerations are "active" constraints to implementing and fully benefiting from engineering advances. Ensuring a "user friendly" interface enhances the viability of the FTTS-UV and support its ability to satisfy intended mission and maximize potential. Increased commonality eliminated training time and need for users to become familiar with new systems.

Automatic Transmission. If the FTTS-UV has a traditional transmission, it shall be automatic.

Rationale. Provides standardization and simplifies driver training while decreasing maintenance requirements. Automatic transmissions improve operator control during severe off-road operations.

Camouflage. The FTTS-UV shall be painted in NATO three-color camouflage or desert tan using Chemical Agent Resistant Coating (CARC) or a DA G4

approved substitute (Threshold). The FTTS-UV shall employ signature reduction techniques and materials in order to reduce its detection by visible, infrared, near-infrared, radar, laser, and acoustic devices (Objective).

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.

Nuclear, Biological, and Chemical (NBC). The FTTS-UV shall be capable of operating in NBC environments and have NBC contamination/decontamination survivability through the use of a contained vehicle systems, thereby eliminating the opportunity to have contact with outside contagions.

Rationale. In an NBC environment, decontamination is a necessity for continued operations. Therefore, equipment design must consider compatibility with potential contaminating agents and decontamination processes. Surviving contamination and decontamination is necessary to ensure the FTTS-UV is still operationally acceptable after operating through an NBC contamination situation.

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

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.

Chemical Agent Resistant Coating (CARC). FTTS-UV must be hardened against agent absorption to preclude damage to the FTTS-UV 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: CANE study shows that system effectiveness, unit operational performance, and command and control will be degraded if the CB hazard is not reduced.

The FTTS-UV 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. CEP 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.

Nuclear Survivability. The critical functions of the FTTS-UV shall survive the initial effects from nuclear weapons where at least one crewmember remains combat effective. The critical functions of the FTTS-UV shall be High-Altitude Electromagnetic Pulse (HEMP) survivable. The FTTS-UV 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-UV are driving and providing power to the payload, to include vehicle subassemblies and component parts needed to accomplish these tasks.

Rationale. 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-UV configuration(s). In cases where the FTTS-UV is a critical component of another system, it must survive initial nuclear weapon effects to the level directed by those systems.

Electromagnetic Interference (EMI). The FTTS-UV 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. 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.

Flashing Warning Beacon Kit. A 360-degree flashing warning beacon kit shall be made available for mounting on the FTTS-UV.

Rationale. The requirement for a 360-degree flashing warning beacon kit is needed to ensure an adequate warning device is available when needed for lead and trail vehicles for such tasks as convoy and wide load warning vehicles. A flashing-type warning beacon is a significant improvement over older style rotating warning beacons because of less moving parts and a higher reliability under field conditions.

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. All CID must be joint interoperable / understood.

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

Crew Compartment Protection Kit. The FTTS-UV shall have a kit made up of two parts, an Underbody Protection Kit and a Ballistic Protection Kit. The combined kit shall provide protection to soldiers in the crew compartment, defined as the primary and secondary seating area. The kit design shall minimize mission degradation of the vehicle to which it is attached. The protection kit shall be designed with several components that can be installed independently of each other.

Rationale. The crew compartment protection kit is included as part of the vehicle requirement so the vehicle and kit will be designed together to ensure complete compatibility when installed in the field. This protection kit requirement is in consonance with the approved Crew Protection Kit (CPK) ORD for previously fielded wheeled vehicles. Independently installed components allow the commander to tailor protection based protection needed to meet the perceived threat.

Underbody Protection Kit (UPK). The crew compartment protection kit shall include a UPK with the following capabilities. The UPK shall 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 requirement is in consonance with the approved CPK ORD and the predecessor Up-Armored HMMWV Addendum to the HMMWV JMENS

document and establishes protection levels that enhance soldier survivability against mines and explosives in combat and peacekeeping environments.

Ballistic Protection Kit (BPK). The crew compartment protection kit shall include a BPK with the following capabilities:

Small-Arms Protection. The BPK shall 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. The BPK shall 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 requirement is in consonance with the approved CPK ORD and the predecessor Up-Armored HMMWV and establishes protection levels which enhance soldier survivability against small arms ammunition and mortar/artillery fire anticipated in combat and peace keeping environments.

Mounting. Mounting provision shall be installed on all vehicles that allow for independent installation of the components of the UPK and BPK as well as the combination of the two. No welding shall be required to mount kit components on factory installed mounting provisions. Either mounting or demounting of the complete system shall be accomplished within 2 clock hours (Threshold) (30 minutes - Objective) using two maintainers and tools found at Field Maintenance level.

Rationale. Installation at Field Maintenance level is dictated by operational deployment readiness and allows for removal in CONUS during training and administrative operations. The requirement for no welding allows for installation and removal without permanent modification to the vehicle. The truck is effectively out of service during the mounting/demounting process; therefore attainment of the Objective will increase the availability of the truck. (This is also based upon emerging requirements of the FCS UA.)

Crew Compartment Protection Kit Maintenance Impact.

The crew compartment protection kit design shall not interfere with maintenance of the vehicle to which attached. 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.

The crew compartment protection kit shall require no maintenance beyond standard Preventive Maintenance Checks and Services (PMCS) performed by the operator using onboard BII 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 Protection Kit Storage. The 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.

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.

Winch Kit.

A winch kit (electric desired) with cable, chain, shackle, and snatch block shall be provided. The winch kit shall have the following characteristics:

Rationale. A vehicle operating in remote areas off road can easily become mired while negotiating unfamiliar terrain. Based on Mission, Enemy, Terrain, Troops, and Time Available (METT-T), a recovery vehicle (wheeled wrecker) may not be available within a reasonable length of time. Depending on the situation, such delay could be extremely hazardous to the occupants. Providing an "operator friendly" winch kit will allow the FTTS-UV operator to expediently extract the vehicle from a mire situation and complete the mission. The desired electric powered winch more efficiently uses the power available on the FTTS-UV.

The winch shall be capable of operations to both the front and rear of the vehicle. The time to change winch directions shall not exceed 60 minutes (Threshold) (30

minutes - Objective) by two soldiers (Threshold) (one soldier - Objective) using FTTS-UV BII tools.

Rationale. Time constraints and requirement to use FTTS-UV BII tools allows crew flexibility to self-recover from a wide range of situations without impacting on the overall mission. A vehicle unable to be recovered in a timely manner may have to be abandoned / destroyed. This requirement envisions a maximum of 1.5 hours elapsed time for the total recovery cycle from the time the vehicle gets stuck until it is again underway. The 30 minutes Objective time to change winch directions will provide a factor of safety in the total recovery time and ensure a greater number of successful recovery operations. It is the Objective that only one soldier be required to accomplish all winch tasks, since this vehicle may frequently be operated by one soldier.

The winch shall be capable of being removed and installed on another vehicle by two soldiers, using BII, in 60 minutes (Threshold) (30 minutes - Objective) or less.

Rationale. Time constraints and requirement to use FTTS-UV BII tools allows commanders and crew personnel the flexibility to reconfigure vehicle assets in a timely manner while in the field. The Objective reduces the turnaround time to put a vehicle in the field with winch capability thus reducing the risk of having to abandon a vehicle in the field.

The winch, cable, and BII winch accessories shall be able to withstand and overcome loads equal to two times the GVW of the FTTS-UV.

Rationale. To provide sufficient strength to extract a vehicle in a fender depth mire (i.e., mired to the top of the wheels) as recommended by the Army Executive Agent for Vehicle Recovery.

The winch cable must be long enough to reach an anchor 45 feet (Threshold) (75 feet Objective) from the FTTS-UV and return (using the snatch block) to enable self-recovery with a 2:1 mechanical advantage.

Rationale. To ensure sufficient cable to safely recover from most situations.

The winch shall incorporate an automatic brake that stops the cable from paying out when not under power.

Rationale. The automatic brake is needed to prevent inadvertent payout of the cable when the power is off and the cable is under load.

The winch shall have a free spooling capability.

Rationale. A free spooling capability is needed to enhance hook-up operations by allowing the cable to pay out without having to use winch power.

The FTTS-UV shall have mounting points/power supply provisions for mounting the winch kit and provide control for inside-/outside-vehicle operations.

Rationale. Provisions for a demountable winch are needed for ease in moving from one vehicle to another (in the case of vehicles in maintenance or unserviceable turn-ins). Capability of inside-/outside-vehicle operation permits operator the flexibility of using vehicle traction in self-recovery or using the stationary vehicle to assist in recovery of another vehicle.

Gunner Restraint System. Those FTTS-UV versions having a self-defense weapon shall have a gunner restraint system, which allows 360 degree, weapon operations while preventing ejection of the gunner in case of an accident. This system shall not hinder quick reentry into the vehicle.

Rationale. The restraint system is required to minimize catastrophic injury resulting from an accident and to prevent the gunner from being inadvertently ejected during rough off-road operations.

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 for 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.

Fuel Efficiency (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 900 miles (Threshold) 1500 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.

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.

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. In summation, FTTS-UV shall have the capability to quickly cross level supplies between platforms (FTTS to FTTS and FTTS to FCS) inside the UA.

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

For notification of out-of-cycle re-supply, cross-leveling and to reduce sustainment requirements FTTS-UV shall incorporate an embedded mission readiness system. This system will monitor the status of mission-critical components/subsystems (including the crew) and all consumables. These sensors will collect and transmit to a data collection point the amount of fuel on-board, rounds remaining, potable water on-board, and rations on-board. 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 operating 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. It will maintain compatibility with all systems at higher and with all (objective) / the majority (threshold) of the FCS systems for

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.

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-MRV 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-UV design 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-UV 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-UV will have the capability to remain operational in areas where fuel supplies are limited to what is available on hand.

Fuel Sustainment. Each FCS FoS (FTTS-UV) platform must be capable of operating for three days of high intensity or 7 days of low intensity without external refueling operations while operating on the required DoD single fuel.

Rationale: The FTTS-UV must have sufficient on-board fuel supply to ensure that it can complete its defined OMS/MP missions without refuel. The DoD has directed that all new acquisitions use a single kerosene based fuel.

Tires/Wheels. The FTTS-UV 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 four tires - Objective) for at least 30 miles (Threshold) (60 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.

Front-End Protection. The FTTS-UV shall have front-end protection (e.g., brush guard/splash guards, etc.) to prevent damage to vehicle lights, body, and engine components, and to reduce/prevent water/mud ingestion into the radiator area while traveling cross-country at cross-country speeds.

Rationale. Certain missions require the FTTS-UV to travel through areas of heavy brush and shrubs. Front-end protection will protect vehicle engine compartment and reduce damage caused by shrubs or similar debris impacting the engine compartment. Splash protection may be necessary if water and mud splash can damage or otherwise affect the operation of the vehicle. Brush guards are acceptable.

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.

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 ancillary 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-UV systems shall be designed to allow crews to perform on-site repairs. 80% 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-UV systems must be designed to minimize inherent repair time demands.

The FTTS will require no more than 10 common tools on the on board and 10 additional common tools on the FTTS-MRV 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

Rationale: Electronic systems within the FTTS-UV 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-UV 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

Training

Any manned FTTS-UV 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-UV 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.

Rationale: Embedded training systems cannot be physically separated from its platform and therefore must be sustained as part of the FTTS-UV 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-UV 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.

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.

The FTTS-UV 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-UV 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 which can support performance of off-vehicle / near-vehicle battlefield functions while recognizing the peacetime reality of off-vehicle training and training management.

Embedded Training

Embedded Training will be inherent in FTTS-UV 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 (Integrated Electronic Technical Manual).

Rationale: The communications capabilities in the FTTS-UV will support downloads of training content that can be delivered to the soldier in his 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-UV must communicate and transfer data through an organic electronic vehicle/asset tracking system compatible with current (threshold) or emerging (objective) C4I systems.

Rationale: TBD

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

Rationale: TBD

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: TBD

Logistics and Readiness

Logistics.

The FTTS-UV must be supported by the standard Army logistics system. Reliability and Maintainability (R&M) characteristics of the components of the FTTS-UV shall be consistent with comparable systems currently in use in similar commercial or DoD applications. The FTTS-UV 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-UV shall use to the greatest extent feasible built in test/built in test equipment (BIT/BITE) and embedded diagnostics with Interactive Electronic Technical Manual (ITEM) capability.

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

The system shall be constructed of materials that will withstand on-deck storage aboard pre-positioned afloat vessels. When stored, the FTTS-UV shall be maintained so that it is readily available for deployment.

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

Readiness. The FTTS-UV must attain a fully capable readiness status using the Army's standard Army maintenance system, plus any specific test, measurement and diagnostic equipment (TMDE).

Reliability, Availability, and Maintainability Objectives. The FTTS-UV 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, FCS 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. FCS 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

FTTS-UV shall possess mobility enhancements that reduce Soldier workload through environmental ride quality and task automation

Rationale: Specific human engineering enhancements will ensure each FTTS-UV soldier arrives at the battle location in good condition, ready to fight and win.

ANNEX A COMMAND AND CONTROL MODULE

ANNEX B UTILITY MODULE

Cargo Bed Cover. The FTTS-UV shall have mounting provisions for the current Army accepted Family of Cargo Bed Covers (CBC), Type I, FTTS-UV Version.

Rationale. Certain using units require, for the accomplishment of their mission, a lightweight hard-wall cargo bed cover. The ability of future FTTS-UVs to accept the CBC for light vehicles eliminates the need to develop a new lightweight hard wall cover.

Tarp and Bows Kit. A tarp and bows kit for the FTTS-UV shall be made available.

Rationale. A tarp and bows kit is required by certain using units for the accomplishment of their mission.

Snowplow Kit. A snowplow kit that has capabilities at least as good as the current light vehicle snowplow kit shall be made available for mounting on the FTTS-UV. Use of the existing light vehicle snowplow is acceptable. Mounting Modification Work Order (MWO) and power supply provisions shall be provided with the kit.

Rationale. Engineer units and other support elements are required to plow snow in order to maintain Main Supply Routes (MSR) and all access roads and roadways. Also, snow removal from staging areas, parking areas, helipads, and similar areas is required to ensure safe operating conditions.

ANNEX C AMBULANCE MODULE

FTTS Utility-Ambulance

1.0 General. FTTS Utility-Ambulance is a medical evacuation system within both the Unit of Action and Unit of Employment. It shall maintain commonality in chassis and parts with all types of FTTS vehicles to the greatest extent possible. Requirements common to all FTTS Manned Systems are discussed in the FTTS Utility ORD.

1.1 The time sensitive nature of treating critically injured soldiers requires an immediately responsive force health protection system with an expedient field evacuation system. Air is the preferred method of casualty evacuation. Critical patients cannot be held far forward for 3-7 days without evacuation to higher echelon healthcare. Science and Technology are not expected to provide a method to hold critically injured patients far forward in the Objective Force timeframe (2015-2025). Dispersion of supported elements over extended areas of operation, and changes in the OF operational environment will challenge the medical support structure. To maximize survivability, severely injured casualties must receive advanced Trauma Life Support within 1 hour. This is accomplished by having an FTTS Utility-Ambulance configured for enroute patient care. The FTTS Utility-Ambulance is an integral variant of the FTTS Utility that contributes to sustaining and generating combat power to the OF structure.

1.2 The major focus of the FTTS Utility-Ambulance will be to provide uninterrupted, lifesaving medical treatment and evacuation throughout the operational spectrum. The FTTS Utility-Ambulance must support all tactical operations for a Major Theater War and/or tasks associated with Stability and Support Operations (SASO) and peacekeeping and enforcement operations.

2.0 Capabilities Required.

2.0.1 Responsiveness.

2.0.1.1 General.

2.0.1.1.1 No unique requirements.

2.0.2 Deployability.

2.0.2.1 General.

2.0.2.1.1 No unique requirements.

2.0.3 Agility and Versatility.

2.0.3.1 General.

2.0.3.1.1 The FTTS Utility-Ambulance module must provide sufficient height to be used as a evacuation platform, while retaining the capability of transporting four litter patients (Threshold/Objective).

Rationale: This medical module will use the same chassis and internal dimensions common to the base FTTS Utility platform. The vehicle must allow sufficient space for medical personnel to provide the required medical capabilities (i.e. treatment and evacuation on the battlefield) while meeting the air transportability and deployment criteria.

2.0.3.1.2 FTTS Utility-Ambulance module must be capable of treating and evacuating patients during movement operations (en-route care) (Threshold/Objective).

Rationale: The characteristics of the operational environment/OPTEMPO, based upon strategic war plans occasionally resulting in increased dispersion of support elements over an extensive range of operations, and unsecured LOCs, results in significantly increased casualty evacuation times. This capability is therefore required for medical personnel to maneuver, while supporting elements. This also decreases the duration vehicles will remain stationary, making them less vulnerable to enemy attack.

2.0.4 Lethality.

2.0.4.1 General.

2.0.4.1.1 No unique requirements.

2.0.5 Survivability.

2.0.5.1 General.

2.0.5.1.1 FTTS Utility-Ambulance module must be capable of displaying Geneva

Convention markings that can be removed/covered, without significant alteration to the vehicle's camouflage pattern, within 2 minutes from outside the vehicle (Threshold) and 1 minute from inside the vehicle (Objective).

Rationale: Medical transport vehicles are required to display Geneva Convention markings when transporting personnel.

2.0.5.1.2 FTTS Utility-Ambulance module must be capable of treating and evacuating casualties while under a CBRN threat and in a contaminated environment (Threshold/Objective).

Rationale: Casualty treatment and evacuation requires a stable environment in which casualties can be fairly accurately and effectively diagnosed and treated without the casualty, or medical personnel, being in MOPP clothing/equipment.

2.0.6 Sustainability.

2.0.6.1 General.

2.0.6.1.1 FTTS Utility-Ambulance module must be capable of conducting medical procedures and treatments using networked tele-medicine interfaces, Medical Command, Control, Communications, and Computers (MC4), and the Theater Medical Information Program (TMIP) (Threshold/Objective).

Rationale: Restrictive medical force structure limitations and increased dispersion of supported elements over extended ranges of operations will result in decreased availability of physicians and Physician Assistants further limiting the availability of more extensive medical treatment and evacuation to the Warfighter. As a result, the individual combat medic will require the capability to leverage technology in order to consult with a physician or P.A. from the battlefield. TMIP is a joint program that consolidates and makes accessible all forms of medical information theater-wide to include all DMLSS applications.

2.0.6.1.2 FTTS Utility-Ambulance module must be capable of supporting physiological status monitoring equipment. (Threshold/Objective).

Rationale: The combat medic must be able to monitor the casualty's physiological condition. This alerts the combat medic to assess when further medical intervention is required.

2.0.6.1.3 FTTS Utility-Ambulance module must be capable of conducting remote triage (Threshold) in conjunction with Objective Force Warrior interfaces (Objective).

Rationale: The ability to identify and monitor casualties remotely by triage category is required. This optimizes the combat medic's ability to identify and monitor a casualty's status without further exposure to enemy attack, as well as allowing him to prioritize casualty care based upon available data/resources.

2.0.6.1.4 FTTS Utility-Ambulance module will have storage area(s) for the crew's (three soldiers) individual gear and clothing. The module will provide accessible and adequate interior space for ambulance mission package, individual weapons, and NBC protective posture clothing/equipment. The storage area must not interfere with the loading, unloading or the care of patients. The storage area may not interfere with any deployability requirements (Threshold/Objective).

Rationale: Currently crew's store their gear on a litter or patient workstations (occupying valuable patient space) or outside the vehicle (requiring the crew to expose themselves in order to access it). The requirement is a medical evacuation asset which can function at full operational capacity.

2.0.6.1.5 Modularity of FTTS Utility-Ambulance compartment for all equipment to include power supplies, Patient Movement Items (PMI), etc.

Rationale: FTTS Utility-Ambulance module must be capable of incorporating all PMI. This includes adequate power storage modules which permit easy access for use or removal during patient transport. PMI storage must not interfere with treatment or transport of patients (Threshold/Objective). PMI must stay with a casualty throughout the evacuation. Some items, such as suction equipment and ventilators, require electricity. The FTTS must provide a way to power these pieces of equipment and allow easy transfer of such items between platforms, to include U.S. Air Force and Army Aircraft.

.**2.0.6.1.6** FTTS Utility-Ambulance module must be enabled by advanced integrated healthcare systems capable of providing rapid medical diagnosis, treatment, stabilization, resuscitation, advanced life support, and monitoring/reporting real-time medical status during medical sustainment operations, at time of fielding (Threshold/Objective).

Rationale: The characteristics of the operational environment/OPTEMPO, coupled with severely restrictive medical force structure limitations, increased dispersion of supported elements over extended ranges of operations, and unsecured LOCs, will result in delayed access to more definitive health care. This will require enhanced medical technologies and capabilities, in order to save lives.

2.0.6.1.7 FTTS Utility-Ambulance module must have the capability to interface with the casualty's medical information device (carried by individual soldiers) and/or a collective medical records database. It must provide the ability to enter and retrieve medical records/information (Threshold/Objective).

Rationale: The Electronic Information Carrier (EIC) will replace the Field Medical Card in the OF. FTTS Utility must have the capability to read the EIC, or other personal information system, used at the time of fielding. The entire system must provide a seamless, modular, expandable, and secure manner in which to rapidly acquire, transfer, and display critical medical information on the battlefield or other operational environment. The system must be compatible with all types of computer hardware, securely store text, voice, video, and digital data, have memory cells that do not require batteries, and be designed to allow the system to evolve with technology.

2.0.6.1.8 FTTS Utility-Ambulance module must allow medical personnel to move throughout the interior of the vehicle, while monitoring casualties and performing medical procedures from a stabilized position (Threshold/Objective).

Rationale: In order for the medical personnel to safely perform enroute monitoring and care they must be able to do so from a stable position without fear of being thrown about the interior and becoming another casualty.

2.0.6.1.9 FTTS Utility-Ambulance module must have a lighting system that will provide illumination throughout the work area. System must provide full white and blackout interior illumination with protected, individual fixture switches, and a master on/off switch. Lighting must be maneuverable to provide focused lighting in a specific area for patient treatment. Must contain a lighting system that will provide a general illumination of 110fc or greater throughout the work area. The system must also be capable of providing a focused, adjustable illumination of 240fc at the treatment site. The lighting system must have a blackout, master on/off control, dimming, and automatic shutoff capability. It must also be

compatible for use when the occupants are wearing a night vision goggle (NVG) device (Threshold/Objective).

Rationale: Patient treatment requires additional lighting capabilities beyond the requirements for all manned platforms. The 240fc illumination is the required amount of lighting to enable the medical crew to perform necessary procedures. The lighting must be maneuverable to reduce shadows at wound/ treatment sites.

2.0.6.1.10 FTTS Utility-Ambulance module must provide easily accessible storage for medical equipment sets (MES) and other medical supplies. Essential MES must be stored inside the vehicle, with additional items stored on the vehicle (Threshold). Must provide adequate storage for MES and additional medical supplies inside the vehicle (Objective). The storage area must not interfere with air/rail loading requirements or the care of wounded.

Rationale: All of the TO&E/CTA equipment and supplies must be stored on board the vehicle in such a manner that the medical personnel have easy access to them, but they are not in the way of the medical personnel performing their job. The interior work area must be free for hands-on airway management, hemorrhage control, and patient monitoring. In order to accomplish these critical life-saving tasks the medical crew must be able to readily access the medical equipment sets while stationary, or on the move. Additional space is required for re-supply items and any soldier owned equipment/weapons evacuated with the soldier.

2.0.6.1.11 FTTS Utility-Ambulance module must provide on-board medical suction. This includes variable controlled, continuous suction to all patient stations with a 2-liter disposable container, minimum vacuum capability of 51 kPa, and a flow rate of 1.4 L/s (Threshold), TBD (Objective).

Rationale: The need to evacuate bodily fluids, clear airways, and clear wounds/ surgical sites is very important during emergency treatment. The capability to remove excess blood and other body fluids will ensure that the casualty receives vital emergency treatment and enroute care.

2.0.6.1.12 FTTS Utility-Ambulance module must have the capability to support and stabilize two 1000-ml IV bags at each litter/treatment station Threshold/Objective).

Rationale: A holder will prevent the IV bag from interfering in-patient loading, unloading, and treatment procedures. Two are needed for each

station because some patients may need an IV in each arm, and 1000-ml is the standard bag size. In addition, the holder will stabilize the bag during transport and allow medical personnel to accurately observe the transfusion flow.

2.0.6.1.13 The FTTS Utility-Ambulance module must have an on-board capability to generate, store, and provide an equivalent adjustable flow rate (3-15 liter/min) of oxygen to four stations simultaneously (Threshold/Objective).

Rationale: Providing oxygen, as soon after injury as possible, at the rate of 3-15 liters per minute, is vital to enhancing the casualty's ability to survive. An effective flow rate of 3-15 liters of oxygen per minute permits the use of a demand oxygen controller. A delivery system will prevent oxygen tubing to one patient from interfering with loading, unloading, or treatment of other patients. Medical vehicles require an on-board oxygen producing system, in order to reduce the safety concerns of handling (and the logistics burden of re-supplying) bottled oxygen, which is the system currently used.

2.0.6.1.14 In all climate conditions, the FTTS Utility-Ambulance must provide a climate control unit (heating/cooling) that provides a stable patient environment temperature (60-85 degrees F) throughout the patient transport/care area (Objective), or stable environmental temperature zones (60-85 degrees F) at each ambulatory seat and litter berth (Threshold). The climate control system must not detract from the medical attendant's ability to view patients or conduct treatment and must allow a controllable adequate airflow to sustain each casualty.

Rationale: Casualty treatment and evacuation necessitates a stable patient environment within the vehicle. Patients must be transported in a temperature-controlled environment to prevent degradation of their condition from either hypo or hyperthermia. Because the vehicle will operate in climatic extremes as specified in the base ORD it is important that the wounded soldier be transported in a clinically acceptable temperature range.

2.0.6.1.15 The FTTS Utility-Ambulance module must be capable of on-board water heating to 100 degrees F (Threshold) and 150 degrees F (Objective).

Rationale: Hot water is necessary for hygiene and sanitation and is imperative to warm IVs in cold weather.

2.0.6.1.16 The FTTS Utility-Ambulance module must provide MANPRINT and human factors acceptable ambulatory and litter patient loading and unloading with 5% female soldiers loading a 95% male patient, using Army standard four-man carry/loading techniques (Threshold/Objective).

Rationale: Ease of access is imperative for the ability to quickly and safely load litter patients into the litter berths. This reduces risk of exposure to hostile activity or inclement weather.

2.0.6.1.17 The FTTS Utility-Ambulance module must provide the capability to carry a combination of up to four (4) litter (NATO Standard Litters) and/or six (6) ambulatory casualties, in addition to the medical crew of three (3) soldiers, within the interior of the vehicle (Threshold/Objective).

Rationale: The dispersion of supported forces and the lack of adequate ground/air evacuation capabilities make it critical that all available vehicles have the ability to transport a large number of casualties. The operational consequence of not meeting this requirement is the inability to evacuate, treat, and return-to-duty combat soldiers, thus restricting the commander's maneuverability and operational control, and his ability to defeat the threat.

2.0.6.1.18 The FTTS Utility-Ambulance module must provide for 28-inches (lateral) and 18-inches (vertical) clearance between standard litters, in the loaded configuration. (Threshold/Objective).

Rationale: Evacuation vehicles must provide adequate room between litters to allow the combat medic sufficient space to provide advanced trauma management (ATM) and enroute care.

2.0.6.1.19 The FTTS Utility-Ambulance must have an accessible attendant's seat that will allow the attendant to change position and visually monitor all patients while the vehicle is in motion.

Rationale: It is necessary for medical personnel to be seated while the vehicle is in motion to prevent injury, however medical personnel must be able to monitor the patient's condition while the vehicle is in motion.

2.0.6.1.20 Must be capable of supporting associated medical equipment (vital signs monitor and suction apparatus, etc.) with 110/220 volts AC 60 Hz and 24 volts DC with the vehicle engine operating (Threshold); by an auxiliary power supply without vehicle engine operating (Objective).

Rationale: Necessary to provide the necessary power requirements to operate medical equipment needed for patient care.

2.0.6.1.21 . Must provide easy access for ambulatory and litter patient loading and unloading using Army standard four-man carry/loading techniques.

Rationale: Ease of access is imperative for the ability to quickly and safely load litter patients into the litter berths. This reduces risk of exposure to hostile activity or inclement weather.

2.0.6.1.22 Provide litter lift and support system to accommodate safe loading, unloading, and transport of patients in the upper litter berths.

Rationale for change: Based on information gained from product development and testing involving the Armored Medical Evacuation Vehicle (Bradley chassis-based ambulance), there is a significant MANPRINT/safety issue involved with the ability for the crew to safely load, transport, and unload litter patients in the upper litter berths. Body positioning and lifting techniques required to load patients in the upper berths could cause back injury.

2.0.7 Training.

2.0.7.1 General.

2.0.7.1.1 No unique requirements.

ANNEX D COMPANION TRAILER

FTTS-UV Companion Trailer shall have the following characteristics:

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

Tracking. The FTTS-UV 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-UV companion trailer shall cause no decrease in the mobility characteristics of the prime mover

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

Brakes.

The FTTS-UV 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-UV 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.

747 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.

753 Backing Truck-Trailer Combination. The FTTS-UV 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.

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

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.