UNCLASSIFIED

Capability Development Document

For

(U) Deep Strike Missile System (DSMS)

Sponsoring Agency: US Army

Signature Authority: Chief of Staff, US Army

Date Submitted:

Primary & Secondary POCs

Name	Title/Position	Phone	Email

Proposed Validation Authority: JROC

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(U) Validation Page

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(U) Executive Summary

This CDD supports the capability requirements for a Deep Strike Missile System (DSMS). A missile that Joint Force Commanders in multiple theaters of operations consider an essential joint fires capability to address their deep strike and time sensitive targeting capability gaps.

DSMS is being developed to address the gaps resulting from the termination of the Army Tactical Missile System (ATACMS). The DSMS warhead will comply with the DoD Policy on Cluster Munitions and Unintended Harm to Civilians.

The Deep Strike Fire Support Capabilities-Based Assessment (DSFS CBA) highlights the deep strike capability gaps resulting from the termination of the ATACMS program. This exacerbates a gap in the ability of the land force commander to employ immediately available, surface to surface, all-weather, long range, precision fires against both precisely and imprecisely located, time sensitive and high value point and area targets, at ranges beyond current capabilities.

DSMS will enable the Combatant Commander to attack enemy high value targets protected under the umbrella of next generation air defense systems to include electronic guidance jamming and manipulation systems, directed energy systems and kinetic countermeasures.

Launched from mobile ground platforms, DSMS will penetrate enemy integrated air and missile defenses, and precisely deliver lethal munitions against point and area targets. It will destroy an adversary's critical warfighting capabilities, provide the maneuver forces access to previously denied areas, and enhance the survivability and effectiveness of other air and sea-launched direct attack weapon systems thereby setting conditions for the success of follow-on forces.

DSMS is envisioned to be employed in the initial phases of a conflict to help set conditions for rapid achievement of air superiority by the Joint Force. In subsequent phases, the missile will be employed in all indirect fire roles to include counter-fire against selected high value, heavily defended targets in support of the commander’s operational and tactical scheme of maneuver.

DSMS munitions development, production, and fielding strategy will allow future technology integration to achieve objective requirements. Technology areas envisioned for insertion include increased range, engagement of time-sensitive, moving, hardened and fleeting ground and maritime targets.

Additional technologies emerging from the Army’s research and development centers will provide a variety of kinetic, non-kinetic, lethal, and non-lethal effects against a wider range of targets. DSMS is expected to achieve MS C in FY xx and Initial Operational Capability (IOC) in FY xx timeframe.

(U) Table of Contents

(U) Revision History

Version #	Date	Purpose

(U) Other Points of Contact

Name	Title/Position	Phone	Email

1. (U) Operational Context

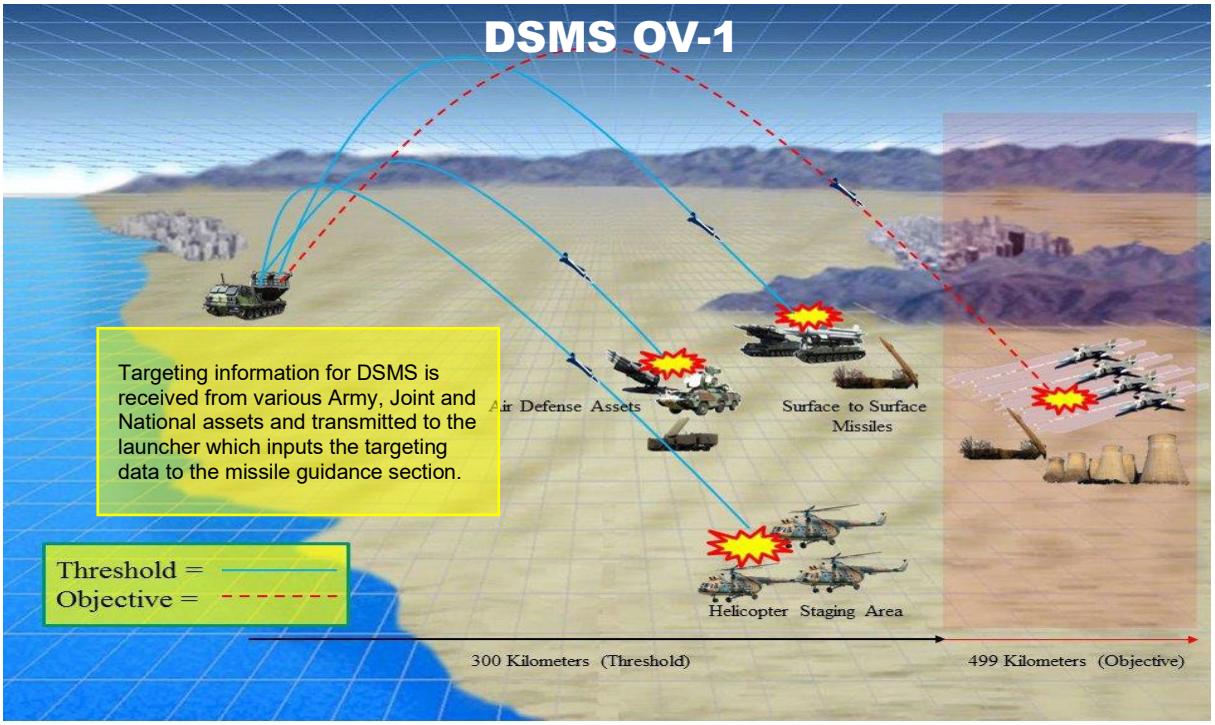
1.1 (U) Validated Source Document Citations.

Deep Strike Mission Capability ICD, Joint Fires in Support of Expeditionary Operations in the Littorals ICD, Guided Multiple Launch Rocket System – Alternate Warhead (GMLRS-AW) CDD, the ATACMS Operational Requirements Document (ORD), the Deep Strike Fire Support Analysis of Alternatives.

1.2 (U) Operational Context Summary.

This CDD addresses the capability requirements gaps for deep strike precision engagement of targets as identified in the DSMC-ICD and establishes the requirement for a surface-to-surface missile to strike long range critical targets with increased lethality and accuracy, while reducing unexploded ordnance to less than 1%. DSMS will enable U.S. forces to engage point and area targets in all operational and environmental conditions.

(U) Figure 1-1. OV-1 DSMS Capability



2. (U) Threat Summary

2.1 (U) Threat Assessment Citation

The latest threat assessment applicable to the DSMS is the Validated Online Lifecycle Threat (VOLT) Report for ATACMS (S//NOFORN). The DSMS VOLT is under development. The DSMS draft VOLT is available at SIPRNET URL: xx

2.2 (U) Threat Summary Outline

2.2.1 (U) Threats to be Countered

DSMS must counter kinetic and non-kinetic threats to achieve desired levels of force protection and system survivability. DSMS's operational mission profile brings it into direct contact with a wide variety of threats including small arms, unguided rockets, heavy machine guns, counterbattery artillery fires, and sea, air, and ground launched guided missiles utilizing infrared/ultra-violet (IR/UV), imaging, radiofrequency (RF), and laser sensors. DSMS will be subject to the incendiary, blast, and fragmentation effects produced by indirect fire munitions or improvised explosive devices. Non-kinetic means employed by adversaries run the full range of information and cyber operations including jamming, spoofing, exploitation, tampering, interfering with communications and network connectivity, as well as attacks from electromagnetic pulse, RF (high-power microwave), and directed energy weapons (low-, mid-, and high-power lasers) targeting sensors, antenna, electronics, and crew. The widespread use of small commercial drones, loitering miniature aerial munitions (LMAM), and free ranging or autonomous Unmanned Aircraft System (UAS) present significant risks to DSMS. Refer to the VOLT for detailed classified threat systems.

2.2.2 (U) Operational Environment

Near-peer technologies and capabilities require the Joint Force to successfully penetrate, dis-integrate, and exploit enemy A2/AD. Threat A2/AD utilize extensive camouflage, concealment, and deception (CCD), routine and extensive radar emissions control (EMCON), employ "shoot & scoot" tactics, and exploit protected sites (i.e., hospitals) to avoid detection and targeting by Joint standoff Intelligence, Surveillance, and Reconnaissance (ISR). Threat ground forces, including those shielding artillery missiles and radars, possess highly lethal and accurate laser guided threats from armored fighting vehicles. These low/ultra-low altitude threats are not a focus of the Joint Airpower community. Therefore, DSMS must be survivable in an environment with previously unidentified, or bypassed, enemy forces that will attempt to destroy DSMS during the conduct of its mission. The extended MDO battlespace and transient periods of superiority mean that these threats, as well as small arms and unguided rockets, exist throughout the depth of the battlespace.

2.2.3 (U) Approved Critical Intelligence Parameter (CIP) Summary

- PR: C550-18-0032 (Deep Strike Missile System (DSMS)) This CIP will assess the progress of the Chinese Shoot Missile Out of the Sky (SMOOTS) anti-missile program and is assessed against KPP 2 Effectiveness and KSA 1 Missile Integrity of the DSMS. SMOOTS is developing a space based, optically tracked, ground fired, anti-missile system that will protect 1,000 square kilometers of territory. It is not operational and not in testing but is predicted to achieve an operational capability in 2032. Since this anti-missile program can shoot missiles out of the sky, the achievement of an effectiveness of threshold 70% probability of damage (PD) and the missile reaching its intended target intact are the bases of a breach. The CIP will be breached if the technology readiness level (TRL) of SMOOTS reaches 5.
- PR: C550-18-0007 (Assured Position, Navigation, and Timing (A-PNT)) Summary omitted.
- PR: C550-18-0016 (Cybersecurity, Strategic Mission Command & sub-component systems) Summary omitted.

3. (U) Capability Discussion

3.1 (U) Validated Capability Requirements Overview

3.1.1 (U) Operational Outcomes.

The relevant components of JP 3-09, Joint Fire Support, and the applicable Joint Concepts indicate the Field Artillery (FA) operational concepts and missions will remain the same; however, future combat operations will be executed in a joint, multi-national, and interagency environment. The future operational environment (OE) will be multi-dimensional and non-contiguous in nature. The FA must be capable of supporting that force with the right mix of combat power, at the right time and place in the OE, and in all weather conditions. DSMS provides the tactical and operational commanders the capability to neutralize or destroy a wide variety of deep precisely and imprecisely located targets, setting the conditions for other joint assets to conduct deep attack missions and to engage deep, time sensitive targets that cannot be attacked with other fire support or joint assets in all weather conditions.

3.1.2 (U) Effects it must produce.

The joint commander requires the capability to engage time sensitive, militarily significant, area materiel and personnel targets at extended ranges in all weather conditions with lethal effects. Additionally, it provides the commander with the means to suppress, delay or destroy targets that have an immediate impact on the battle; destroying or reducing the enemy's ability and will to continue the conflict, therefore reducing US casualties.

3.1.3 (U) How it complements the integrated Joint Warfighting Force.

DSMS complements other attack assets to include cruise missiles and both manned and unmanned aircraft, especially in those cases where the other assets are unable or unavailable to attack targets in a timely fashion. The ability to provide 24/7 all-weather capability to engage targets using this munition by the Multiple Launch Rocket System (MLRS) and High Mobility Artillery Rocket System (HIMARS) make it one of the most versatile FA weapon systems available for both joint and combined arms operations. The extended range, lethality, and short time of flight allows support to maneuver units, protecting the force with planned counterfire; suppression or destruction of enemy air defenses; and the attack of operational and strategic time sensitive and/or imprecisely located, high value targets for the Brigade combat team (BCT), division, corps, Marine air-ground task force (MAGTF), or joint task force commander.

3.2 (U) Related Analysis and Studies Summary

3.2.1 (U) Analysis of Alternatives (AoA) (classified). An AoA was directed to investigate several alternatives to meet the need for a deep strike capability. The AoA examined the effectiveness of 1 versus (vs) 2 missiles per pod, single vs dual pulse motor, range, cost and risk factors for the alternatives. After careful consideration of the AoA report, and upon the advice of the Army Chief of Staff, the SAE determined that threshold requirements for a range of 300 km and 1 missile per launcher pod, as the most cost effective and lowest overall technical risk. (Classified Appendix D).

3.2.2 (U) Capabilities Based Assessment (CBA). The Deep Strike Fire Support (DSFS) CBA identified gaps that DSMS addresses: 1) limited precision munitions capability to support operations across all domains of multi-domain operations, and 2) limited ability to provide precision fires at ranges required (300 km+) to support maneuver forces across the area of operations. The CBA recommended materiel acquisition efforts to meet these unfulfilled gaps.

The CBA recommended the modernization of the suite of FA ammunition (cannon and rocket/missile; nonlethal, Dual Purpose Improved Conventional Munitions (DPICM) replace, extended range and discriminating seeker). This modernization effort was ranked as one of the 3 highest priority efforts across the Fires Warfighting Function to mitigate existing gaps.

3.2.3 (U) Range Requirements Analysis. A requirements analysis was conducted by the Fires Center of Excellence (FCoE) to determine the number of targets by range against approved scenarios. The analysis determined the optimum threshold and objective system range and validated that there were significant quantities of critical military targets in the threshold and objective ranges to warrant an investment in this deep strike capability.

3.2.4 (U) Science and Technology (S&T) Investment Areas. Army Futures Command (AFC) prioritized S&T investment to inform and provide guidance for POM input to aid in realigning the investment Fires Portfolio across a 30-year timeframe. Analysis establishes the requirement for extended range precision surface-to-air and surface-to-surface fires as the number one priority for the POM/FYDP timeframe.

3.2.6 (U) AFC Army Missile Capability Gap Assessment. The results of the AFC capability gap assessment provided an integrated, prioritized list of materiel capability gaps which potentially had missile related solutions and provided a 1-n ordered list of recommended solutions and S&T focus areas that were relevant to current operations and the full spectrum fight. The ATACMS capability was prioritized #9 with significant or moderate mission impairment if not available. The 1-to-n material gap priority was #6 “Modular forces ability to effectively and efficiently engage area and imprecisely located targets (massed formations of enemy forces, individual targets dispersed over a defined area, time sensitive or moving targets) in response to decisive engagement, counterstrike, and shaping missions throughout the division/corps/JTF area of operations is decreasing and ultimately will be severely degraded upon full implementation of the DoD Cluster Munition Policy.”

3.2.7 (U) Conclusion and Recommendation. The body of analysis documented above provides sufficient justification and analytical underpinnings to support the capability development need for long range surface to surface precision strike.

4. (U) Program Summary.

DSMS is being developed to address the gaps resulting from the termination of the ATACMS missile program and the operational impacts of the DoD cluster munition policy. DSMS is expected to achieve MS C in FY 28 and Initial Operational Capability (IOC) in the FY 32 timeframe. Enhanced capabilities beyond IOC will be initiated based on technology maturation, user needs, doctrine, capability gap analysis, contingency operations and resourcing.

4.1 (U) Program Strategy.

4.1.1. The DSMS munitions development, production, and fielding strategy will allow future technology integration to achieve objective requirements. Technology areas envisioned for insertion include Enhanced Warhead, Propulsion, Navigation, and Guidance & Control. The threshold target engagements will emphasize area, imprecisely located, and point targets. Technology insertions will provide the capability to engage targets in complex and urban terrain out to the objective range while minimizing collateral damage.

4.2 (U) Initial Operational Capability (IOC) and Full Operational Capability (FOC) Definitions

4.2.1 (U) IOC Definition and target date. IOC target date is FY 32. IOC is defined as the technical and tactical Fire Control System (FCS) updated software is available and in place, training has been conducted, and 40 launch pod missile containers (LPMC), for one HIMARS Battery combat load are in place.

4.2.2 (U) FOC Definition and target date. FOC target date is FY 36. FOC for the program is defined as training and logistical support in place, technical and tactical fire control software in-place, and 80 LPMCs are available for use.

4.2.3 (U) Assets Required to Attain IOC and FOC.

4.2.3.1 (U) Asset Type Description**.** The technical and tactical FCS updated software is available and in place. The final Training Support Package (TSP) for Individual and Collective Training is available in final form, and one HIMARS Battery combat load of 40 LPMCs is required to achieve IOC.

4.2.3.2 (U) Operational Units Employing Capability. Will be utilized by the current M270A1 MLRS and M142 HIMARS fleet and will be transported by the logistics assets currently in the force.

4.2.3.3 (U) Initial Quantity Required. One HIMARS Battery combat load (40 LPMC).

4.2.3.4 (U) Asset Summaries. The technical and tactical FCS software is available and in place and 40 LPMCs available to achieve IOC.

4.3 (U) Dependencies.

The DSMS is a member of the Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM) that will complement the current suite of GMLRS rockets and will replace the obsolete ATACMS. It complements other deep attack assets to include cruise missiles and manned aircraft, especially in those cases where the other assets are unable or unavailable to attack deep targets. It is synchronized along with other manned and unmanned assets using existing command and control systems.

5. (U) Development Key Performance Parameters (KPPs), Key System Attributes (KSAs), and Additional Performance Attributes (APAs)

5.1 (U) Mandatory KPPs

5.1.1 (U) Force Protection

Justification: Force Protection does not apply because DSMS is not designed to prevent or mitigate hostile actions against personnel, resources, facilities, and critical information.

5.1.2 (U) System Survivability

Justification: System Survivability does not apply because it is a single shot, unmanned munition. However, the DSMS shall not degrade or adversely affect the survivability of the legacy launchers of the system.

5.1.3 (U) Sustainment.

Justification: Sustainment does not apply to the DSMS missile itself as the missile is a terminally destructive single shot munition.

5.1.4 (U) Energy.

Justification: DSMS is a single shot munition and does not use operational energy, nor does it have an energy consumption relevant to sustained performance over scenario timelines.

5.2 (U) Additional KPPs, KSAs, or APA.

5.2.1 (U) KPP 1 Range. Ranges are 300 km Threshold (T) and 499 km Objective (O) with minimum ranges 70 km (T) and 60 km (O) when the launcher and target are at mean sea level and firing through the U.S. standard atmosphere (1976).

(U) Rationale: DSMS AoA determined that the threshold range was capable of reaching most of the targets in the commander's area of operations and that the objective range was capable of servicing virtually all operational targets in the area of operations. In addition, the mobility of HIMARS (on the 6x6 Family of Medium Tactical Vehicles) provides the capability to maneuver to firing positions that puts additional enemy target sets at risk when firing DSMS.

5.2.2 (U) KPP 2 Effectiveness. The missile shall achieve a 70% probability of damage (PD) versus (vs) point targets and a 30% fractional damage (FD) for area targets, respectively employing the quantity of missiles shown at the given TLE as indicated in classified Appendix D, Table 5.1. PD is defined as the probability of achieving the desired effect against the selected target. FD is used to represent the percentage of an area target that will meet the desired effects criteria.

(U) Table 5.1 Target Definition

				Quantity of Missiles to Achieve Kill Criteria**	
Target	**Dimension**	**Scenario Configuration**	**Kill Criteria**	**TLE 10m** T/O	**TLE 30m** T/O
Flap Lid B Air Defense Radar	7m x 3.25m	Deployed, Radiating	Mission Kill[1]	T/O	T/O
SCUD Missile (SS-1c) Launch Site	14m x 3.5m	Travel Mode	Firepower Kill[2]	T/O	T/O
Helicopter Staging Area (HIP-C)	120m x 50m	Active PZ (Troops loading)	PTO-4[3]	T/O	T/O

Notes:

1. Mission Kill: The measure of the degree of target damage that prevents the target from completing its designated mission; however, it is not removed from the inventory (except for missiles in flight and unmanned aerial vehicle). Specifically, for radars and satellite communications: neutralization of those functions that are necessary for the radar to search and detect targets for some period of time. It can be achieved by defeating at least one of the defined critical phases or functions of the facility e.g. HVAC, power, communications, etc.

2. Firepower Kill: Damage or effects that render the target immediately incapable of firing its primary armament and duration is indeterminate. Crew casualties may be included in an F-kill.

3. Prevent Take-off (PTO) 4: The measure of the degree of aircraft damage that renders it incapable of takeoff. Prevent takeoff 4 kill assumes the aircraft is damaged to the extent that it is not flyable until a damage survey is conducted and generally requires some repairs, refueling, rearming, preflight checking, etc. requiring a recuperation time of at least 4 hours.

*** Note:** Table 5.1 is based on Army Materiel Systems Analysis Agency (AMSAA) lethality data for specific targets in open and flat ground without any countermeasures. Quantities will change as lethality data, improvements to guidance packages, countermeasures applied and/or DSMS TTPs are updated. Data will be reflected in JTCG-ME Weaponeering System (JWS).

** **Note**: Quantity of munitions to achieve kill criteria is classified and contained in Table 5.1 Classified Appendix D

(U) Rationale: The DSMS AoA determined the preliminary quantity of missiles required to effectively attack these representative targets.

5.2.3 (U) KSA 1 Missile Integrity. The missile shall remain intact until terminal detonation (T=O).

(U) Rationale: Debris from the missile must not pose a hazard to friendly forces and/or civilians where DSMS is being employed

5.2.4 (U) KSA 2 Ownership Cost.

(U) Table 5.2 Ownership Cost

	Estimated Costs (BY 13 $M)	
Cost Element	**High (T)**	**Low (O)**
Total Ownership Cost	$ 163.87	$148.97
2.0 Unit Operations (only POL)	NA	NA
3.0 Maintenance	$76.86	$69.87
4.0 Sustaining Support	$74.72	$67.93
5.0 Continuing System Improvements	$12.28	$11.17
6.0 Indirect Support	NA	NA

5.2.5 (U) KSA 3 Reliability. Shall be such that the probability of the missile successfully passing

flight readiness, conditioning checks, launch, flight, and warhead event is no less than 0.80 (T), 0.95 (O) over the ten-year service life given a fully mission capable launcher.

(U) Rationale: This is mission essential and must possess a high degree of availability to allow timely fires in the support of the commander's mission and objectives. This KSA addresses the intent of the Sustainment KPP. Analysis conducted by the Combat Capabilities Development Command Data and Analysis Center shows that an initial reliability of 80% is a realistically achievable reliability level for a new start missile.

5.2.6 (U) KSA 4 LPMC Compatibility. Physical dimensions (i.e. height, width, length) and weight of the LPMC must be compatible with the current M270A1 and M142 launchers, existing ground/air transporters and other logistical assets (T=O).

(U) Rationale: The LPMC must be fully operational with the current family of launchers to avoid the cost of developing new launchers. Its weight must be the same as the current LPMC to avoid costly changes to current logistical/materiel handling equipment.

5.2.7. (U) KSA 5 Angle of Fall. Missile must be capable of 90-degree terminal angle of fall (plus or minus 10 degrees) for all ranges between the minimum range plus ten percent and maximum range minus twenty percent (T); capable of 90 degree terminal angle of fall at all ranges (O).

(U) Rationale: Enables employment and optimal effects against targets in rugged/high mountainous areas with intervening crests, as well as complex urban terrain.

5.2.8. (U) APA 1 Off-Axis Launch Capability. Will have at least an X degrees off axis launch capability as measured from the launcher to the target. Additional trajectory shaping may be considered in order to increase missile and/or launcher survival (T=O). For actual values see paragraph 5.2.8 in the classified Appendix D.

(U) Rationale: The ability for off axis launch reduces launcher detection/location and enhances survivability.

5.2.9. (U) APA 2 Time of Flight (ToF). Will be consistent with the current MFOM (T); decreased ToF when compared to current ATACMS (O).

(U) Rationale: Must maintain or decrease TOF profile to deny the enemy the ability to detect the incoming rocket and take measures to vacate, go into a protective posture or activate point defenses.

5.3 (U) KPP/KSA/Other Attributes Rollup

(U) Table 5.3 Key Performance Parameters

Tier 1-3 JCAs	Key Performance Parameter	JPR (check box)	Threshold	Objective
3. Force Application 3.2 Engagement 3.2.1 Kinetic Means	KPP 1 - Range	☐	(U) Max range 300 km; minimum range 70 km	(U) Max range 499 km; minimum range 60 km
3. Force Application 3.2 Engagement	KPP 2 - Effectiveness		(U) The warhead shall achieve a	(U) The warhead shall achieve a 70%

(U) Table 5.3 Key Performance Parameters				
Tier 1-3 JCAs	**Key Performance Parameter**	**JPR (check box)**	**Threshold**	**Objective**
3.2.1 Kinetic Means		☐	70% probability of damage (PD) Versus (vs) point targets and a 30% fractional damage (FD) for area targets, respectively employing the quantity of missiles shown at the given TLE as indicated in classified Appendix A, Table 5.1.	probability of damage (PD) Versus (vs) point targets and a 30% fractional damage (FD) for area targets, respectively employing the quantity of missiles shown at the given TLE as indicated in classified Appendix A, Table 5.1. .

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(U) Table 5.4 Key System Attributes			
Tier 1-3 JCAs	**Key System Attributes**	**Threshold**	**Objective**
3. Force Application 3.2 Engagement 3.2.1 Kinetic Means	KSA 1 Missile Integrity	(U) Intact until terminal detonation	(U) T=O
9. Corporate Management and Support 9.4 Acquisition 9.4.4 Acquisition Management 9.5 Program, Budget and Finance 9.5.1 Program/Budget & Finance	KSA 2 Ownership Cost	(U) Base Year (BY) $163.87M	(U) BY $148.97M
3. Force Application 3.2 Engagement 3.2.1 Kinetic Means	KSA 3 Reliability	(U) Probability of the missile successfully passing flight readiness, conditioning	(U) Probability of the missile successfully passing flight readiness, conditioning checks, launch, flight, and warhead event is

(U) Table 5.4 Key System Attributes			
Tier 1-3 JCAs	**Key System Attributes**	**Threshold**	**Objective**
		checks, launch, flight, and warhead event is no less than 0.80	no less than 0.95
3. Force Application 3.2 Engagement 3.2.1 Kinetic Means	KSA 4 Launch Pod Missile Container (LPMC) Compatibility	(U) Pod dimensions and weight are compatible w/current launchers and logistical capabilities	(U) T=O
3. Force Application 3.2 Engagement 3.2.1 Kinetic Means	KSA 5 Angle of Fall	Missile must be capable of 90 degree terminal angle of fall (plus or minus 10 degrees) for all ranges between the minimum range plus ten percent and maximum range minus twenty percent	Missile capable of 90 degree terminal angle of fall at all ranges

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(U) Table 5.5 Additional Performance Attributes			
Tier 1-3 JCAs	**Additional Performance Attribute**	**Threshold**	**Objective**
3. Force Application 3.2 Engagement 3.2.1 Kinetic Means	APA1. Off-Axis Launch	DSMS will have the ability to be launched X degrees off axis. See Table 5.1 in the classified Appendix D for value.	T=O
3. Force	APA 2. Time of Flight (ToF)	Missile	ToF profile will be

(U) Table 5.5 Additional Performance Attributes			
Tier 1-3 JCAs	**Additional Performance Attribute**	**Threshold**	**Objective**
Application 3.2 Engagement 3.2.1 Kinetic Means	/Velocity Profile	ToF/velocity profile will be consistent with the current MFOM	decreased with greater terminal velocity when compared to current ATACMS (O).

6. (U) Other System Attributes

6.1 (U) Embedded Instrumentation, EA and WARM requirements.
Not applicable.

6.2 (U) Human System Integration.

6.2.1 (U) Manpower. Introduction of the DSMS capability shall not increase the overall quantity of personnel, both, military and civilian, required to operate, maintain, and support the MFOM.

6.2.2 (U) Personnel: New aptitudes, skills, or capabilities beyond those identified in the Target Audience Description and in the Knowledge, Skills, Abilities, and Other characteristics (KSAOs) for the current MFOM and MLRS and HIMARS fleets will not be required.

6.2.3 (U) Training: The PM and TRADOC proponent will update the complete training subsystem to support the program. This training subsystem will include all training devices and training materials necessary to provide individual and collective training in both institutions and units. Representation will be incorporated into appropriate existing and future training devices (i.e., MCTD Trainer, Missile/Launch Pod Assembly Trainer, Fire Control Panel Trainer, and Command and Control Tactical Trainer). The Training Support Package (TSP) for Individual and Collective Training will be available in final form for IOC. Training will include Explosive Ordnance Disposal (EOD) training. Test Player/Refresher Training will be conducted prior to the Initial Operational Test (IOT). No additional training requirements are defined. It is not feasible to fire for training due to major resource constraints, i.e., land and cost requirements necessary to support training.

6.2.3.1. (U) Training Subsystem. The training subsystem will be based upon a precisely defined set of performance requirements obtained through analysis or collection of supportability analysis data. Based on the results of this analysis additional Military Occupational Specialty (MOS) operator and maintenance tasks should not add to the force structure and should be compatible with the current MFOM.

6.2.3.2. (U) System Training Plan (STRAP) Summary. Prior to MS B, the training developer (TD) will conduct a review of the existing MLRS/HIMARS/MFOM STRAPs to determine if a new STRAP for DSMS is required; the existing STRAPs should be updated or if a waiver will be acceptable.

6.2.3.3 (U) Individual, Unit, and Crew Training. Operator and maintenance training will be conducted as part of New Software Fielding in 2 phases: classroom instruction covering characteristics, operations, operator maintenance, and employment of the DSMS; and hands-on

training in different environments. Employment and leader training will cover characteristics and capabilities to include planning and employment considerations; maintenance and sustainment; and an overview of tactics, techniques, and procedures.

6.2.3.4. (U) Institutional training will be responsible for training on the employment of the DSMS and sustaining its operations in combat and will be integrated into current leader courses as required.

6.2.3.5. (U) Operational unit training will be responsible for sustaining individual and collective proficiency of I4 tasks. Unit training will be based on the training support package (TSP).

6.2.3.6. (U) New Equipment Training (NET). Formal NET is not required for the munition. DTT/Leader training for operational employment will be conducted during new AFATDS/ launcher software fielding.

6.2.3.7. (U) Training Test Support Package (TTSP). The Directorates of Training and Doctrine will develop an initial TTSP and provide to the test officer at least 18 months before Operational Testing (OT). The final TTSP will be delivered not later than (NLT) 60 days before test player training begins. The TTSP will also support Instructor and Key Personnel Training (I&KPT) as well as Test Player Training for OT.

6.2.3.8. (U) NET TSP. The Software Training Support Package that contains DSMS capabilities will serve as the NET TSP during the AFATDS/launcher Software Fielding.

6.2.3.9. (U) Interactive Media Instruction (IMI) Products. IMI does not apply.

6.2.3.10. (U) Technical Manuals (TMs) and Training Materials. TMs for operators and maintainers will be produced to military standard in the Functional Group Code format and undergo a contractor validation and government verification process to ensure accuracy and completeness. The current electronic technical manuals (ETM) shall be upgraded to include DSMS. Operator, field, and sustainment levels of maintenance will be upgraded in the current Maintenance Allocation Chart (MAC) found in the field and sustainment maintenance TMs. Depot maintenance work requirements will be created for the establishment of organic depot capability and will be upgraded as appropriate, throughout the life cycle of the system.

6.2.3.11. (U) System Support Package. The PM will update the complete system support package for the system (e.g., individual and collective task analysis, institutional devices, embedded training system, Tactical Proficiency Trainer, simulators, I&KPT).

6.2.3.12. (U) Reach-back Training. None.

6.2.3.13. (U) Unit and Institutional training aids, devices, simulators and simulations (TADSS). As appropriate, system and non-systems TADSS should be updated as necessary to include any new capabilities associated with the munition. EOD has a requirement for 2x Classroom Explosive Ordnance Disposal System Trainer (CEST) and 5x Practical Explosive Ordnance Disposal System Trainer (PEST).

6.2.3.14. (U) Desktop Trainer. The Fire Control Panel Trainer shall be updated to include DSMS.

6.2.4 (U) Human Factors Engineering. The DSMS capability design shall promote effective Soldier-machine integration for optimal total system performance. Design principles taking into account human capabilities and limitations shall be incorporated into system definition, design, development, and evaluation. This includes concepts of human-computer interface (e.g., ease of

perception and comprehension of displays, ease of use of controls) and compatibility of DSMS capability with other mission-essential equipment (including but not limited to use with standard combat gear, CBRN, and environmental clothing). The DSMS capability should not interfere with the performance of common Soldier tasks. Equipment design must consider mission-dependent tasks and demands through consultation with SMEs, in order to maximize ease of use, minimize workload and enhance mission performance.

6.2.5 (U) Health Hazards: A health Hazard Assessment (HHA) will be requested from the U.S. Army Public Health Command early in the development or procurement process. The HHA will be updated at each Milestone Decision Review.

6.2.6 (U) Soldier Survivability. The PM will assess risks to personnel and address, in terms of system design, protection from direct threat events and accidents.

6.3 (U) Natural Environmental Factors Natural Element and Expected Mission Capability.
Operation, maintenance, and manufacture will be in conformance with all environmental laws and regulations. Ozone depleting substance will not be used in production. The DSMS will operate effectively in the same climatic categories as the basic MLRS/HIMARS system and will have an operational and storage capability in climate categories 1 through 6 as specified in AR 70-38

6.4 (U) Physical and Operational Security.
Will not require any unique physical or operational security measures from what is currently being used for the MFOM.

6.5 (U) Weather, Oceanographic, and Astrophysical Support.
As a munition, the DSMS missile does not require any weather, oceanographic or astrophysical

6.6 (U) Allied Coalition Support.
Foreign Military Sales of DSMS are TBD.

6.7 (U) Transportability and Deployability considerations. Not Applicable.

6.8 (U) SWaP-C margin requirements. DSMS must not adversely affect the size weight or power margins of the current missile launcher from which it will be fired.

6.9 (U) Chemical, Biological, Radiological, or Nuclear (CBRN) Survivability.

The LPMC must meet the contamination and survivability requirements in Chemical, Biological, Radiological (CBR) environments and be capable of withstanding the materiel damaging effects of contaminants, decontamination, and field procedures required to decontaminate down to negligible risk levels. Employment must be compatible with Soldiers in Mission Oriented Protective Posture IV.

6.10 (U) Nuclear Survivability.
Mission essential functions shall be survivable in storage, while in transport, and on the launcher against the Initial Nuclear Weapons Effects (INWE) of blast, thermal and initial nuclear radiation to the same level as the launchers. Mission essential electronics shall be survivable against High altitude Electro-Magnetic Pulse (HEMP) in storage, while in transport, and on the launcher. However, it does not have to operate through the HEMP or INWE event. Recycling of platform power to restore operations is acceptable.

6.11 (U) Attribute Description.

Item Unique Identification (IUID) Strategy. IAW with DoDI 8320.04, IUID Standards and HQDA Strategy for IUID the PM will determine if the end items and their applicable sub-components are required to use IUID for accountability purposes.

6.12 (U) Weapon Storage.

Storage and handling requirements shall be no different from that required for any other MLRS munitions.

6.13 (U) Electronic Countermeasures.

The vulnerability of the system to electronic countermeasures including electronic guidance jamming and manipulation systems, directed energy systems and kinetic countermeasures will be kept to a minimum.

6.14 (U) Environment, Safety, Occupational, and Health (ESOH).

The DSMS shall incorporate Environment, Safety, Occupational and Health (ESOH) planning throughout the program life cycle to minimize ESOH related risks and support system sustainability. The DoD Standard Practice for System Safety, MIL-STD-882E, will be used early in system planning and design and throughout the system lifecycle to identify and evaluate ESOH hazards, to mitigate their associated risks, and provide life-cycle documentation of risk management consistent with industry practice. Risk acceptance at a level of management consistent with hazard shall be in accordance with MIL-STD-882E.

6.15 (U) National Environmental Policy Act (NEPA).

The DSMS and furnished accessories shall be designed to eliminate or minimize environmental impact in support of the NEPA. In conjunction, the DSMS shall be in compliance with Executive Order (EO) 12114, EO 13423, EO 13514 and other applicable EOs. The DSMS design, if feasible, shall reduce or eliminate the use or production of regulated hazardous materials, chemicals, wastes, and Greenhouse Gases which include Ozone Depleting Chemicals.

6.16. (U) Electromagnetic Environmental Effects (E3).

DSMS shall be electromagnetically compatible within itself and with other equipment/systems in its operating environment. The operational performance shall not be degraded by E3. Platform/system/subsystem electromagnetic compatibility performance requirements will comply with current government requirements for all electromagnetic disciplines.

6.17. (U) Cybersecurity.

The DSMS program will comply with cybersecurity requirements in DoD Instruction (DODI) 5000.02, 8500.01; DODI 8510.01 Risk Management Framework for DoD Information Technology; Cybersecurity Test & Evaluation Guidebook as it applies to this system; and OSD Memorandum “Procedures for Operation Test and Evaluation of Cybersecurity in Acquisition Programs.”

7. (U) Joint Interoperability.

7.1 (U) NET Ready.

Justification: Net-Ready does not apply for the following reasons: 1) DSMS is a one shot munition; 2) it is a closed loop system, (i.e. it only provides information to the launcher when queried by the launcher); 3) it does not process information from the Global Information Grid (GIG) nor does it place any information on the GIG for action by other entities; 4) the munition does not and cannot reach out to any fire support (FS) system and extract information for its own

use, (it is totally dependent on the launcher for its targeting information) and 5) once launched the munition does not interact with the FS system or the GIG other than to passively receive Global Positioning System (GPS) signals.

7.2. (U) Modular Open Systems Approach (MOSA).

7.2.1 (U) The DSMS will be designed with a modular open system approach. The guidance subsystem(s); control subsystem; motor subsystem; and warhead/fuze subsystem must each interface through standard open interfaces that will allow these subsystems to be modified or replaced individually without redesign of the others.

7.2.2. (U) The DSMS architecture must be capable of preventing or reducing the susceptibility of cyberattack and mitigate and recover from successful attacks.

7.3. (U) Fires Integration.

DSMS must not introduce any adverse effects upon the missile launcher's current capabilities with respect to entering and managing connectivity to the current Army Field Artillery Tactical Data System (AFATDS), or its replacement.

8. (U) Spectrum and Electromagnetic Environmental Effects Control Requirements

All electrical and electronic systems, subsystems, and equipment must comply with electromagnetic environmental effects (E3) direction IAW DoDI 8500.01, Cybersecurity. Requirements to ensure mutual electromagnetic compatibility (EMC) and effective E3 control in its electromagnetic environment will be identified prior to MS B based on design selection.

9. (U) Intelligence Supportability

Because DSMS is a one-shot munition, it does not have intelligence supportability requirements different than the launcher platform from which it is fired.

10. (U) Weapon Safety Assurance

10.1 (U) System Safety:

The PM will initiate a comprehensive safety program early in the acquisition process IAW AR 385-10, DA Pam 385-16, and MIL-STD-882E, to ensure that DSMS can be safely operated, maintained, and supported. All safety hazards associated with use, maintenance, transportation, storage, handling, and demilitarization of DSMS will be eliminated or reduced to an acceptable level of risk. The risk associated with residual hazards, if any, will be subject to acceptance by the designated approval authority. A system safety assessment report (SAR) will be completed as part of the design process to ensure DSMS is free from conditions that can cause death, injury or illness to Soldiers. The resolution of hazards will be formally documented through a hazard tracking system and the establishment of a System Safety Working Group. Operational and safety parameters, once identified, should be included in the operator's TM.

10.2 (U) Insensitive Munitions.

The capability to withstand unplanned stimuli is needed to prevent or minimize the probability of inadvertent initiation and the possible collateral damage to weapons platforms, logistics systems and personnel. Therefore, munitions used in DSMS will be capable of resisting insensitive munitions (IM) threats (accidents and combat) per the standardized IM protocols (established by JROCM 235-06 and based on common international agreements unless variations for unique circumstances are validated by the JROC.

10.3. (U) Fuze Safety.
The PM will confirm compliance with all appropriate DoD requirements.

10.4. (U) EOD.
PM will ensure that all DoD coordination requirements with the EOD research, development, test and evaluation (RDT&E) authority are properly conducted and documented.

10.5. (U) Demilitarization/Disposal.
The DSMS program shall ensure the demilitarization and disposal of materiel is accomplished in accordance with DoDI 4160.28, DoD Demilitarization Program and ensure disposal is accomplished in accordance with DoD 4140.1-R, Supply Chain Materiel Management Regulation and DoD 4160.21-M, Defense Materiel Disposition Manual.

10.6. (U) Laser Safety.
Since the DSMS is an Inertial/GPS guided munition and does not rely on a laser for targeting purposes, this requirement is not applicable.

10.7 (U) E3 Ordnance Safety. DSMS will comply with E3 ordnance safety requirements IAW MIL-STD-464C and MIL-STD_461G, including but not limited to hazards of electromagnetic radiation to ordnance, electrostatic discharge, EMP, electromagnetic interference, electromagnetic vulnerability, lightning, and precipitation-static.

10.8. (U) Weapon Packing, Handling, Storage, and Transportation:
DSMS will comply with the safety standards for packing, handling, storage, and transportation IAW DoDM 6055.09.

11. (U) Technology Readiness.
An Independent Technical Risk Assessment (ITRA) was conducted prior to Milestone A, and will be updated prior to Milestone B.

11.1 (U) Technology Challenges.
The PM's initial assessment revealed that the Critical Technology Elements identified in Table 11.1 have Technology Readiness Levels (TRLs) of 5. TRL 5s were assigned for each critical technology based on R&D center assessment, pending prototyping, and testing during the TMRR phase. No significant technology challenges are expected. A Technology Readiness Assessment will be conducted during TMRR to inform the ITRA update prior to Milestone B.

Table 11.1 Critical Technology Summary		
Associated KPP / KSA	**Critical Tech Element**	**Critical Technology Element Description**
KPP 1 Range	(U) Motor	(U) Provides the thrust needed to deliver the warhead to the distances required on the modern battlefield.
KPP 2 Effectiveness KSA 3 Reliability	(U) Warhead	(U) Will maximize the effects on area, accurately or inaccurately located targets where collateral damage may or may not be a factor.
KPP 2 Effectiveness KSA 3 Reliability	(U) Guidance and Control Section	(U) Provides guidance, control, and navigation capability to the missile over the entire flight profile.
KPP 2 Effectiveness KSA 3 Reliability	(U) Fuze	(U) Detonates the warhead at the right place and time.

12. DOTmLPF-P Considerations.

12.1 Doctrine.
The DSMS will require doctrinal changes to account for increased ranges and potential target sets based on the achieved ranges of the technology maturation and risk reduction phase of the program.

12.2 Organization.
DSMS is replacing existing missiles fired from existing missile launchers currently fielded with Field Artillery organizations. Some minor adjustments to organizational structure may be indicated during initial operational testing and early user tests.

12.3 Training.
The impact to the training domain is fully incorporated in section 6 of this CDD.

12.4 Materiel
The contractor will design the missile such that no modifications to existing missile launchers will be necessary. Changes to interfaces between the missile guidance section and the launcher/fire control systems may be necessary

12.5 Leadership and Education.
Leadership training across the Army will be revised to ensure awareness of the DSMS capabilities.

12.6 Personnel.
No changes to existing personnel or skill sets are required by the introduction of the DSMS.

12.7 Facilities.
No changes to existing facilities are required by the introduction of the DSMS.

12.8 Policy.
The increased ranges sought in the DSMS program are the direct result of the United States dropping out of the INF treaty with Russia. Policy statements constraining range of DSMS and

similar missiles to the INF treaty are being eliminated from Army, DoD and other USG related policy documents.

13. Program Affordability.

Table 13.1 Acquisition Required Resources[1]

BY$$[2]	FY22-23 (Current)	FYDP						Post FYDP (FY22-FY60)	To Complete (FY22-FY60)
		FY24	FY25	FY26	FY27	FY28	FYDP Total		
RDTE	60.7	90.6	130.8	98.7	135.8	113.2	569.1	432.9	1061.7
Proc	-	-	-	-	-	-	-	3848.5	3848.5
MILCON	-	-	-	-	-	-	-	-	-
O&M (Acq)	-	-	-	-	-	-	-	342.8	342.8
MILPER (Acq)	-	-	-	-	-	-	-	-	-
Total (Acq)	60.7	90.6	130.8	98.7	135.8	113.2	569.1	4624.2	5253.0
Acq Quant	0	0	10	0	0	9	19	2876	2895

Warfighter Required Resources for System Operations and Support[3]

BY$$[2]	Pre-IOC Ops (FYxx-FYaa)	IOC to FOC Ops (FYaa-FYbb)	Post-FOC Ops (FYbb-FYcc)	Ops Life (FYxx-FYcc)	**Notes:**
O&M (Ops)					[1] Current year is FYxx. First post-FYDP year is FYyy. End of planned production run is FYzz.
MILPER (Ops)					[2] All resources normalized to a standard base year reference - BY$$.
Total (Ops)					[3] Planned IOC is FYaa. Planned FOC is FYbb. Planned end-of-life is FYcc.

(U) Appendix A – References

AR 381-11, Intelligence Support to Capability Development
AR 385-10, The Army Safety Program
AR 40-10, Health Hazard Assessment Program in Support of the Army Acquisition Process
AR 700-145, Item Unique Identification (IUID)
AR 70-1, Army Acquisition Policy
AR 70-38, Research, Development, Test and Evaluation of Material for Extreme Climatic Conditions
AR 73-1, Test and Evaluation Policy
Chairman Joint Chief of Staff Instruction (CJCSI) 5123.01H, Charter of the Joint Requirements Oversight Council (JROC) and the Implementation of the Joint Capabilities Integration and Development System (JCIDS) 31 August 2018
Chairman Joint Chief of Staff Manual (CJCSM) 3500.04F, Universal Joint Task Manual
DA Pam 385-16, System Safety Management Guide
DA Pam 73-1, Test and Evaluation Policy
DoDD 3222.3, DOD Electromagnetic Environmental Effects (E3) Program
DoDD 5160.62, Single Manager Responsibility for Military Explosive Ordnance Disposal Technology and Training (EODT&T)
DoDD 5250.01, Management of Intelligence Mission Data in DOD Acquisition
DoDI 4140.01. DOD Supply Chain Materiel Management Policy
DoDI 4160.28, DoD Demilitarization Program
DoDI 4650.01, Policy and Procedures for the Management and Use of the Electromagnetic Spectrum
DoDI 5000.85, Major Capability Acquisition, 6 Aug 2020
DoDI 8320.04, Item Unique Identification (IUID) Standards
DODI 8500.01, Cybersecurity
DODI 8510.01 Risk Management Framework for DoD Information Technology
DoDM 6055.09 (Volumes 1-8), DoD Ammunition and Explosives Safety Standards
Fires Center of Excellence Range Requirements Analysis
Guided Multiple Launch Rocket System – Alternate Warhead (GMLRS-AW) CDD, (CARDS # 04033), approved 22 November 2011
JCIDS Manual, 31 August 2018, URL:
Joint Fires in Support of Expeditionary Operations in the Littorals, Initial Capabilities Document, 19 Dec 2005
Joint Requirements Oversight Council Memorandum 047-15, 15 May 15
JOTP-051, Technical Manual Department of Defense Joint Ordnance Test Procedure (JOTP) - Technical Manual for the Use of Logic Devices in Safety Features.
JOTP-052, Department of Defense Joint Ordnance Test Procedure (JOTP) - Guideline for Qualification of Fuzes, Safe and Arm (S&A) Devices, and Ignition Safety Devices (ISD)2.
JROCM 235-06, Insensitive Munitions Standards and Passing Criteria, 6 Nov 2006
Memorandum, DOD Policy on Cluster Munitions and Unintended Harm to Civilians, 19 Jun 2008.
MIL-STD-1316F, Department of Defense Design Criteria Standard - Fuze Design, Safety Criteria
MIL-STD-2105D, Department of Defense Test Method Standard - Hazard Assessment Tests for Non-Nuclear Munitions

MIL-STD-461G, Department of Defense Interface Standard - Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment.
MIL-STD-464C, Department of Defense Interface Standard - Electromagnetic Environment Effects Requirements for Systems
MLS-STD-882E, Department of Defense Standard Practice for System Safety.
Multiple Launch Rocket System Operational Requirements Document, approved 14 Nov 2003
TRAC High Mobility Artillery Rocket System (HIMARS) and Guided Multiple Launch Rocket System (GMLRS) Analysis of Alternatives (AoA), March 2002 – April 2003, \
TRAC Center Precision Munitions Mix Analysis (PMMA), Mar 2004 – Nov 2005.
AFC Science and Technology (S&T) Investment Areas

(U) Appendix B - Acronym Listing

AAE	Army Acquisition Executive
Am	Materiel Availability
AMSAA	Army Materiel Systems Analysis Agency
Ao	Operational Availability
AoA	Analysis of Alternatives
APA	Additional Performance Attribute
ATACMS	Army Tactical Missile System
BCT	Brigade Combat Team
BY	Base Year
CNA	Capabilities Needs Analysis
CBA	Capability Based Assessment
C-BA	Cost Benefit Analysis
CBRN	Chemical, Biological, Radiological and Nuclear
CDD	Capability Development Document
CEST	Classroom Explosive Ordnance Disposal System Trainer
COA	Course of Action
COCOMs	Combatant Commands
DPICM	Dual Purpose Improved Conventional Munition
DSFS	Deep Strike Fire Support (DSFS)
DSMS	Deep Strike Missile System
E3	Electromagnetic Environmental Effects
EO	Executive Order
EOD	Explosive Ordnance Disposal
ESOH	Environmental, Safety, Occupational and Health
ETM	Electronic Technical Manual
FA	Field Artillery
FCoE	Fires Center of Excellence
FCS	Fire Control System
FD	Fractional Damage
FOC	Full Operational Capability
FS	Fire Support
GIG	Global Information Grid
GMLRS -AW	Guided Multiple Launch Rocket System – Alternate Warhead
GPS	Global Positioning System
HEMP	High altitude Electro-Magnetic Pulse
HHA	Health Hazard Assessment
HIMARS	High Mobility Artillery Rocket System
I&KPT	Instructor and Key Personnel Training
IAW	In Accordance With
ICD	Initial Capabilities Document
IMI	Interactive Media Instruction
INWE	Initial Nuclear Weapons Effects
IOC	Initial Operational Capability
IOT	Initial Operational Test

770	ITRA	Independent Technical Risk Assessment
771	IUID	Item Unique Identification
772	KPP	Key Performance Parameter
773	KSA	Key System Attribute
774	LPMC	Launch Pod Missile Container
775	MAC	Maintenance Allocation Chart
776	MAGTF	Marine Air-Ground Task Force
777	MFOM	MLRS Family of Munitions
778	MLRS	Multiple Launch Rocket System
779	MOS	Military Occupational Specialty
780	MS	Milestone
781	MSN	Mission
782	NA	Not Applicable
783	NEPA	National Environmental Policy Act
784	NET	New Equipment Training
785	NLT	No later than
786	O	Objective
787	OE	Operational Environment
788	ORD	Operational Requirements Document
789	OSD	Office of the Secretary of Defense
790	OT	Operational Testing
791	PD	Probability of Damage
792	PEST	Practical Explosive Ordnance Disposal System Trainer
793	POM	Program Objective Memorandum
794	RSP	Render Safe Procedures
795	S&T	Science and Technology
796	SEAD	Suppression of Enemy Air Defenses
797	SLEP	Service Life Extension Program
798	SSP	System Safety Plan
799	STRAP	System Training Plan
800	T	Threshold
801	TADSS	Training Aids, Devices, Simulators and Simulations
802	TBD	To Be Determined
803	TCS	Task, Conditions and Standards
804	TLE	Target Location Error
805	TM	Technical Manual
806	TMRR	Technology Maturation and Risk Reduction
807	ToF	Time of Flight
808	TRA	Technology Readiness Assessment
809	TRL	Technology Readiness Level
810	TSP	Training Support Package
811	TTSP	Training Test Support Package
812	USAOMMCS	United States Ordnance, Missile and Munitions Center and School
813	USFK	United States Forces Korea
814	UXO	UnExploded Ordnance
815	Vs	Versus

(U) Appendix C - Glossary

Firepower Kill: Damage or effects that render the target immediately incapable of firing its primary armament and duration is indeterminate. Crew casualties may be included in an F-kill.

Fractional Damage: FD is used to represent the percentage of an area target that will meet the desired effects criteria. It is based on the assumption that targets are evenly spaced throughout the target area. For example if the FD is 0.25 and there were 100 personnel in a target area then an average of 25 personnel would achieve the desired effects. If this is not a valid assumption, then FD represents the fractional area of a target that is assumed to have been damaged to the desire effect.

Mission Kill: Msn Kill is the measure of the degree of target damage that prevents the target from completing its designated mission; however, it is not removed from the inventory (except for missiles in flight and unmanned aerial vehicles). Specifically, for radars and satellite communications: neutralization of those functions that are necessary for the radar to search and detect targets for some period of time. It can be achieved by defeating at least one of the defined critical phases or functions of the facility; e.g. HVAC, power, communication, etc.

Mobility Kill: M-kill is damage sufficient to render a vehicle (or ship) incapable of executing controlled movement within the time interval being assessed and duration is indeterminate. The time-to-failure kill levels are:

M (0)-kill - damage that prevents controlled movement immediately and is not field repairable by crew.

M (5)-kill - damage that prevents controlled movement within 5 minutes and is not field repairable by crew.

M (10)-kill - damage that prevents controlled movement within 10 minutes and is not field repairable by crew.

M (20)-kill - damage that prevents controlled movement within 20 minutes and is not field repairable by crew.

M (40)-kill - damage that prevents controlled movement within 40 minutes and is not field repairable by crew.

M(40)-kill (excluding tires) - damage (excluding tires) that prevents controlled movement within 40 minutes and is not field repairable by crew.

Prevent Takeoff: PTO-kill is a measure of the degree of aircraft damage that renders it incapable of takeoff. Prevent takeoff kill assumes the aircraft is damaged to the extent that it is not flyable until a damage survey is conducted and generally requires some repairs, refueling, and rearming (if necessary, preflight checking, etc.). A catastrophic kill (COG, removed from the inventory) and four time-related kill levels (recuperation time) are typically assessed.

PTO-0 kill - damage that requires recuperation time of at least 5 minutes.

PTO-4 kill - damage that requires recuperation time of at least 4 hours.

PTO-24 kill - damage that requires recuperation time of at least 24 hours.

PTO-72 kill - damage that requires recuperation time of at least 72 hours

Probability of Damage: PD is defined as the probability of achieving the desired effect against the selected target. For example, if you select a target with K-kill as the desired effect, the PD is the percentage chance of achieving a K-kill against that target.

(U) Appendix D – Quantity of Munitions to Achieve Kill Criteria

Appendix D is classified SECRET/NOFORN and provided as a separate file. It provides the quantities of missiles required to meet kill criteria for the specified target sets.