Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army											Date: May 2017	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203801A *I Missile/Air Defense Product Improvement Program*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	-	3.029	53.722	2.723	8.450	11.173	1.661	1.302	1.304	0.130	Continuing	Continuing
038: *Avenger PIP*	-	3.029	7.722	2.723	-	2.723	1.661	1.302	1.304	0.130	Continuing	Continuing
DT5: *Stinger Product Improvement*	-	0.000	46.000	0.000	8.450	8.450	0.000	0.000	0.000	0.000	0.000	54.450

A. Mission Description and Budget Item Justification

The Avenger Air Defense System is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The Avenger's mission is to protect fixed critical assets and Corps/Echelons above Corps Maneuver forces from Unmanned Aircraft Systems (UAS), Cruise Missiles (CM), and Fixed Wing and Rotary Wing aircraft. Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability.

Funding provided for the Avenger PIP ensures that Avenger is viable and sustainable through the end of program life. The Avenger Modification – Service Life Extension Program (MOD-SLEP) keeps Avenger sustainable and relevant until replaced by the Indirect Fire Protection Capability Increment 2- Intercept (IFPC Inc 2-I) in the Fiscal Year (FY) 31 timeframe.

The Stinger Block I missile is an advanced, fire-and-forget, short-range, man-portable, air defense weapon system. Stinger's mission is to provide the force with low-altitude air defense against fixed and rotary wing aircraft, unmanned aircraft systems (UAS) and cruise missiles (CM). Stinger is deployable from the shoulder or from a variety of platforms to include vehicles, helicopters and UAS. The missile is delivered as a certified round and requires no field testing or maintenance.

A SHORAD "shoot off" in 4QFY17 will evaluate industry solutions for mitigating the maneuver SHORAD capability gap. The intent is to determine which industry products that the Army could rapidly field to maneuver units between FY19-25.

Funding provided for the Stinger PIP addresses obsolescence, completes design, development, test and integration of a Proximity Fuse (PROX) into the existing Stinger Block I missile.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army					Date: May 2017
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*		**R-1 Program Element (Number/Name)** PE 0203801A *I Missile/Air Defense Product Improvement Program*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	3.154	5.122	2.209	-	2.209
Current President's Budget	3.029	53.722	2.723	8.450	11.173
Total Adjustments	-0.125	48.600	0.514	8.450	8.964
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.125	-			
• Adjustments to Budget Years	0.000	0.000	0.514	8.450	8.964
• Amended FY2017	0.000	48.600	0.000	-	0.000

Change Summary Explanation

The increase of $2.6M in FY17 Avenger Product Improvement Program (PIP) (Project 038) funding completes integration, testing, Information Assurance certification, and Materiel Release of the Mode 5 Identification Friend or Foe (IFF) as part of the existing Avenger Modification - Service Life Extension Program (MOD-SLEP). The increase of $46M for Stinger PIP (Project DT5)addresses obsolescence and design improvements to the Stinger missile, including the Man Portable Air Defense System (MANPADS) configuration. Developmental improvements include increased detection range, visual identification, and night operations capability. In addition, this funding supports a Short Range Air Defense (SHORAD) "shoot off" in 4QFY17 to evaluate industry solutions for mitigating the maneuver SHORAD capability gap.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / *Missile/Air Defense Product Improvement Program*	Project (Number/Name) 038 / *Avenger PIP*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
038: *Avenger PIP*	-	3.029	7.722	2.723	-	2.723	1.661	1.302	1.304	0.130	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Avenger Air Defense System is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The Avenger's mission is to protect fixed critical assets and Corps/Echelons above Corps Maneuver forces from Unmanned Aircraft Systems (UAS), Cruise Missiles (CM), and Fixed Wing and Rotary Wing aircraft. Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability. Avenger can be air dropped, lifted by helicopter and is air transportable. The system employs up to eight Stinger missiles to counter aerial threats and a M3P gun for close-in ground and air threats. The gunner can visually track targets through use of a Forward Looking Infrared Receiver (FLIR) that can detect and track targets during the day and at night. An on-board laser range finder provides range. An IFF system aids in the identification of friendly aircraft in order to minimize the potential for fratricide. The Avenger fleet has 170 systems that are equipped with a digital Slew-to-Cue (STC) capability to speed target detection and engagement. Forward Area Air Defense (FAAD) Command Control and Intelligence System (C2I) passes radar target information to the Avenger for display. The operator can then select a target for engagement from the display, which will automatically slew the turret and place the target in the gunner's FLIR field of view.

FY2018 Base dollars in the amount of $2.723 million provides funding to ensure the Avenger is viable and sustainable through the end of its program life. The Avenger Modification – Service Life Extension Program (MOD-SLEP) keeps Avenger sustainable and relevant until replaced by the Indirect Fire Protection Capability Increment 2- Intercept (IFPC Inc 2-I) in the Fiscal Year (FY) 31 timeframe. The Avenger Fire Control Computer (AFCC), vehicle internal communication (VIC) system and the IFF will undergo upgrades to meet Information Assurance (IA) and operational requirements.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Avenger Modification	3.029	7.722	2.723	-	2.723
Description: Finish development activities for platform integration, software upgrades, and capability enhancements. Develop and execute test requirements and conduct limited contractor and government testing. Perform technical assessments, concept studies, cost reduction, risk reduction and development documentation.					
FY 2016 Accomplishments: Continued the performance engineering design and development activities for platform integration, software upgrades, and capability enhancements. Developed and execute test requirements and conducted limited contractor and government testing on developing modernization parts. Performed technical assessments, concept studies, cost reduction, risk reduction and development documentation.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203801A / *Missile/Air Defense Product Improvement Program*	**Project (Number/Name)** 038 / *Avenger PIP*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Finish development activities for platform integration, software upgrades, and capability enhancements. Develop and execute test requirements and conduct limited contractor and government testing on developing modernization parts. Perform technical assessments, concept studies, cost reduction, risk reduction and development documentation. Increase testing activities on integration studies to ensure compatibility. ***FY 2018 Base Plans:*** Execute test requirements and conduct limited contractor and government testing. Perform technical assessments, concept studies, cost reduction, and risk reduction. The Army Interoperability Certification (AIC) testing ensures that Avenger can properly interface, with other systems, and execute its mission.					
Accomplishments/Planned Programs Subtotals	3.029	7.722	2.723	-	2.723

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PE 0605456: *PE 0605456A, Proj PA3, PAC-3/MSE Missiles*	2.201	-	-	-	-	-	-	-	-	0	2.201
• PE 0604319A: *PE 0604319A, Proj DU3, IFPC2 (FY12 PE0603305A IFPC II - Intercept)*	149.222	-	31.303	-	31.303	52.604	239.305	259.804	316.104	Continuing	Continuing
• PE 0605457A: *PE 0605457A, Proj S40, Army Integrated Air and Missile Defense (AIAMD)*	222.074	278.811	336.420	-	336.420	290.250	190.600	117.470	64.510	Continuing	Continuing
• PE 0604820A: *PE 0604820A, Proj E10, Sentinel*	11.821	15.983	25.968	-	25.968	31.761	51.897	72.562	81.351	Continuing	Continuing
• PE 0604741A: *PE 0604741A, Proj 126, 146, 149; Air Defense C2I Eng Dev*	33.619	61.532	28.726	-	28.726	28.320	14.638	8.674	-	Continuing	Continuing
• PE 0605052: *PE 0605052A, Proj EY7, IFPC2 (Realigned from 0604319A, DU3*	-	83.995	175.069	-	175.069	149.506	52.300	24.700	-	0	485.570
• SSN C53101: *SSN C53101, MSE Missile*	514.946	702.201	459.040	-	459.040	499.915	540.669	523.413	524.934	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203801A / *Missile/Air Defense Product Improvement Program*	**Project (Number/Name)** 038 / *Avenger PIP*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PE 0205456A: *PE 0205456A, Proj EF9; System Integration and Test*	61.653	73.417	78.926	-	78.926	80.314	109.222	112.614	123.007	Continuing	Continuing
• PE 0604114A: *PE 0604114A, Proj EX2; Lower Tier Air and Missile Defense (LTAMD) Capability*	-	35.132	76.728	-	76.728	67.088	83.195	141.185	142.000	Continuing	Continuing
• SSN C50016: *SSN C50016, Lower Tier Air and Missile Defense (AMD)*	130.275	-	126.470	-	126.470	140.826	125.161	144.234	119.282	Continuing	Continuing
• SSN C62002: *SSN C62002; IFPC Inc 2-I Block 1 Missile*	-	19.319	57.742	-	57.742	31.641	191.830	315.025	277.500	Continuing	Continuing
• SSN C62001: *SSN C62001, IFPC Inc 2-I Block 1 System*	-	-	-	-	-	157.406	144.740	100.400	14.600	Continuing	Continuing
• SSN C62004: *SSN C62004, IFPC Inc 2-I Block 2 Missile*	-	-	-	-	-	-	-	-	12.300	Continuing	Continuing
• PE 0605457A: *PE 0605457A, Proj DU4; Advanced Electronic Protection Enhancements AEPE*	-	-	23.165	-	23.165	25.010	26.719	26.218	26.500	Continuing	Continuing
• SSN BZ5075: *SSN BZ5075, IAMD Battle Command System*	20.917	204.969	282.502	-	282.502	-	274.494	375.026	513.464	Continuing	Continuing
• SSN AD50700: *SSN AD50700; AIR & MSL Defense Planning & Control Sys*	28.176	126.539	26.635	24.100	50.735	17.960	6.366	32.397	-	0	262.173

Remarks

This program is an integral part of the Army Air and Missile Defense Modernization strategy.

D. Acquisition Strategy

The Avenger Product Improvement Program modifies Avenger and ensures that it is viable and sustainable through the FY31, filling a capability gap to counter Unmanned Aircraft Systems (UAS), Cruise Missiles (CM), and Fixed Wing and Rotary Wing aircraft. This capability will be permanently filled by the Indirect Fire Protection Capability Increment 2 - Intercept (IFPC Inc 2-I). The Avenger Fire Control Computer (AFCC), vehicle internal communication (VIC) system and the IFF will undergo upgrades to meet Information Assurance (IA) and operational requirements.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / *Missile/Air Defense Product Improvement Program*	Project (Number/Name) DT5 / *Stinger Product Improvement*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
DT5: *Stinger Product Improvement*	-	0.000	46.000	0.000	8.450	8.450	0.000	0.000	0.000	0.000	0.000	54.450
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Stinger Block I missile is an advanced, fire-and-forget, short-range, man-portable, air defense weapon system. Stinger's mission is to provide the force with low-altitude air defense against fixed and rotary wing aircraft, Unmanned Aircraft Systems (UAS) and cruise missiles (CM). Stinger is deployable from the shoulder or from a variety of platforms to include vehicles, helicopters and UAS. The missile is delivered as a certified round and requires no field testing or maintenance.

The addition of a PROX to the current Block I configuration will improve system effectiveness against the evolving UAS threat. UAS defense is a requirement of the Operational Requirements Document (ORD) for the Stinger Guided Missile System and validated by the Deputy Chief of Staff, G-3/5/7, Current and Future Warfighting Capabilities Division (DAMO-CIC) in a memo dated 28 May 2013.

A SHORAD “shoot off” in 4QFY17 will evaluate industry solutions for mitigating the maneuver SHORAD capability gap. The intent is to determine which industry products that the Army could rapidly field to maneuver units between FY19-25.

FY2018 OCO dollars in the amount of $8.450 million support the continuation of design, development, test, and integration of a proximity fuse into the existing Stinger Block I missile.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Proximity Fuze (PROX) Development and Integration ***Description:*** These funds will be used to continue the design, development, test and integration of a PROX fuze into the existing Stinger Block I missiles. ***FY 2018 Base Plans:*** There are no base dollars ***FY 2018 OCO Plans:*** $8.45M continues the design, development, test and integration of a PROX fuze into the existing Stinger Block I missiles.	-	-	0.000	8.450	8.450
Title: SHORAD Shoot Off	-	20.000	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203801A / *Missile/Air Defense Product Improvement Program*	**Project (Number/Name)** DT5 / *Stinger Product Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Description: This effort funds SHORAD Shoot Off in 4QFY17 ***FY 2017 Plans:*** $20M supports the conduct of a SHORAD "shoot off" in 4QFY17 to assess industry solutions for mitigating the maneuver SHORAD capability gap. The intent is to evaluate industry products that the Army could rapidly field to maneuver units between FY19-25. Candidate solutions must demonstrate sufficient mobility and survivability to support Armored and Stryker Brigade Combat Team operations. Funding supports the integration and testing of non-developmental items into technical solutions. The majority of funding will pay for test support activities including government and contract labor, targets, range support, and transportation of government furnished equipment. The assessment will take place in September 2017 at White Sands Missile Range, New Mexico.					
Title: Obsolescence and Improvements ***Description:*** This effort funds the obsolescence and improvements of Stinger Block I missile. ***FY 2017 Plans:*** $26M addresses obsolescence and design improvements to the Stinger missile, including the Man Portable Air Defense System (MANPADS) configuration. Funding addresses obsolescence issues in the Seeker Dual-Detector Assembly (UV Diodes), Application Specific Integrated Circuit (ASIC), Roll Frequency Sensor (RFS), and the Electronics Assembly. These assemblies face Diminishing Manufacturing Sources and Material Shortages (DMSMS) and exponentially higher costs due to legacy materials and processes. This obsolescence mitigation will allow to Army to increase Stinger reliability and effectiveness while reducing costs as it dramatically increases the number of Stinger missiles inducted into the Service Life Extension Program. Developmental improvements include increased detection range, visual identification, and night operations capability.	-	26.000	-	-	-
Accomplishments/Planned Programs Subtotals	-	46.000	0.000	8.450	8.450

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SSNC21300: *SSN C21300, Stinger Blk I Upgrades*	2.216	-	63.090	28.000	91.090	66.213	72.220	1.470	3.100	0.000	236.309

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203801A / *Missile/Air Defense Product Improvement Program*	**Project (Number/Name)** DT5 / *Stinger Product Improvement*

D. Acquisition Strategy

In Fiscal Year (FY) 12 the Stinger Based Systems (SBS) Product Office utilized Picatinny Arsenal to award a PROX development contract for the design, development, test and integration into existing Stinger Block I missiles. The PROX will improve system effectiveness against the evolving Unmanned Aircraft System (UAS) threat.

E. Performance Metrics

N/A