Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army											Date: May 2017	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602786A / *Warfighter Technology*							
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	-	38.420	37.403	39.559	-	39.559	35.518	36.542	36.628	35.930	-	-
283: *Airdrop Adv Tech*	-	3.057	3.432	3.818	-	3.818	0.000	0.000	0.000	0.000	-	-
E01: *Warfighter Technology Initiatives (CA)*	-	3.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-
H98: *Clothing & Equipm Tech*	-	26.885	26.571	27.450	-	27.450	35.518	36.542	36.628	35.930	-	-
H99: *Joint Service Combat Feeding Technology*	-	3.290	4.919	5.051	-	5.051	0.000	0.000	0.000	0.000	-	-
VT4: *Expeditionary Mobile Base Camp Technology*	-	1.688	2.481	3.240	-	3.240	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

This Program Element (PE) investigates and develops integrated technologies which improve Soldier and Small Combat Unit survivability, sustainability, mobility, combat effectiveness, and field quality of life and assess the impact of each on Soldier performance. This PE supports the design, development, and improvement of components used for aerial delivery of personnel and cargo (Project 283), combat clothing and personal equipment including protective equipment such as personal armor, helmets, and eyewear (Project H98), combat rations and combat feeding equipment (Project H99), and expeditionary base camps (Project VT4). This PE supports the investigation and advancement of critical knowledge and understanding of Soldier physical and cognitive performance. Project E01 funds Congressional special interest items. The Projects in this PE adhere to Tri-Service Agreements on clothing, textiles, and food with coordination provided through the Cross Service Warfighter Equipment Board, the Soldier and Squad Integrated Concepts Development Team, and the Department of Defense (DoD) Combat Feeding Research and Engineering Board.

Efforts in this PE support the Army Science and Technology Soldier/Squad Portfolio.

Work in this PE is related to, and fully coordinated with, PE 0603001A (Warfighter Advanced Technology), PE 0602105A (Materials Technology), PE 0602618A (Ballistics Technology), PE 0602787A (Medical Technology Initiatives), PE 0602716A (Human Factors Engineering Technology), 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0602784A (Military Engineering Technology), PE 0603125A (Combating Terrorism Technology Development), and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work is led, performed, and/or managed by the Army Natick Soldier Research, Development, and Engineering Center (NSRDEC), Natick, MA.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army					Date: May 2017
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*			R-1 Program Element (Number/Name) PE 0602786A / *Warfighter Technology*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	39.295	37.403	34.475	-	34.475
Current President's Budget	38.420	37.403	39.559	-	39.559
Total Adjustments	-0.875	0.000	5.084	-	5.084
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.875	-			
• Adjustments to Budget Years	0.000	0.000	5.084	-	5.084

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: E01: *Warfighter Technology Initiatives (CA)*		
Congressional Add: *Program Increase*	3.500	-
Congressional Add Subtotals for Project: E01	3.500	-
Congressional Add Totals for all Projects	3.500	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army									Date: May 2017			
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602786A / *Warfighter Technology*				Project (Number/Name) 283 / *Airdrop Adv Tech*			
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**
283: *Airdrop Adv Tech*	-	3.057	3.432	3.818	-	3.818	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

This Project funds the research and investigation of component technologies to enhance cargo and personnel airdrop capabilities for global precision delivery, rapid deployment, and insertion for force projection into hostile regions. Areas of emphasis include parachute technologies, parachutist injury reduction, precision offset aerial delivery, soft landing technologies, and airdrop simulation.

Efforts in this Project support the Army Science and Technology Soldier/Squad Portfolio.

The cited work is consistent with Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this Project is fully coordinated with Program Element (PE) 0603001A (Warfighter Advanced Technology).

Work in this Project is led, performed, and/or managed by the Army Natick Soldier Research, Development, and Engineering Center (NSRDEC), Natick, MA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Airdrop/Aerial Delivery Research and Technology	3.057	3.432	3.818
Description: This effort investigates technologies that enhance payload extraction, increase parachute gliding capabilities, and mature delivery accuracy of cargo aerial delivery systems that support varying payload weights. Research in the area of novel parachute materials will provide increased capabilities for cargo and personnel aerial delivery systems. This effort will support an investigation of new Modeling and Simulation (M&S) tools in order to develop validation methods for airdrop concepts. This effort also investigates technologies that advance airborne personnel insertion safety and security. This work is coordinated with PE 0603001A/Project 242.			
FY 2016 Accomplishments: Investigated adaptive flight software to overcome rigging errors and broken control lines of Joint Precision Aerial Delivery System cargo parafoils; utilized M&S of parafoil type decelerators to determine optimum location of actuators for increased control authority and minimize actuator quantities to optimize future system cost; conducted assessment of technologies to increase airdrop system stealth capability while in flight and after impact; continued further advancements of life saving paratrooper static line reserve parachute automatic activation technologies.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602786A / *Warfighter Technology*	**Project (Number/Name)** 283 / *Airdrop Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Study, design, and conduct experiments with precision aerial delivery software and hardware components to enhance high altitude precision aerial delivery capabilities in Global Positioning System (GPS)-denied areas, urban terrains, and jungle environments; investigate novel textiles for parachute applications that enable material properties to be customized which can enhance parachute performance; investigate non-destructive inspection methodologies for helicopter sling load cordage components; refine and validate software algorithms for static line reserve parachute automatic activation technologies. ***FY 2018 Plans:*** Will conduct M&S supporting aerial delivery system analyses to establish a baseline for personnel and cargo airdrop systems utilizing several high- and low-fidelity M&S tools; investigate and analyze results of full-scale wind tunnel experiments and methods for determining parachute shelf/service life; mature software algorithms that support the static line reserve parachute automatic activation sensor technologies in order to better detect parachute malfunctions and record and analyze jump data; investigate precision airdrop enhancements that will expand GPS-denied capabilities to include nighttime operations and design control systems to enhance low-cost airdrop system accuracy.			
Accomplishments/Planned Programs Subtotals	3.057	3.432	3.818

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602786A / *Warfighter Technology*	Project (Number/Name) E01 / *Warfighter Technology Initiatives (CA)*	

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
E01: *Warfighter Technology Initiatives (CA)*	-	3.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Warfighter Technology Applied Research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Program Increase	3.500	-
FY 2016 Accomplishments: Program Increase		
Congressional Adds Subtotals	3.500	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602786A / *Warfighter Technology*	Project (Number/Name) H98 / *Clothing & Equipm Tech*	

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
H98: *Clothing & Equipm Tech*	-	26.885	26.571	27.450	-	27.450	35.518	36.542	36.628	35.930	-	-

A. Mission Description and Budget Item Justification

This Project investigates fibers, textiles, components, and materials focused on enhancing Soldier survivability from combat threats (flame and thermal, blast and ballistic, multispectral sensor, and laser threats) and environmental threats (e.g., cold, heat, wet, vector, antimicrobial, etc.) to increase operational effectiveness while decreasing the Soldier's physical and cognitive burden. Included are investigations of technologies, novel materials, and test methods related to personnel armor, helmets, hearing protection, eyewear, uniforms, handwear, footwear, and other clothing and individual equipment items. This Project also supports the investigation and development of novel combat identification technologies, and electro-textiles for power generation and distribution. In addition, this Project supports the development and refinement of essential analytic tools needed to predict and/or assess the combat effectiveness of next generation Soldier systems to identify and develop methods to assess human responses to sensory, physical, cognitive, and affective stimuli and stressors.

Efforts in this Project support the Army Science and Technology Soldier/Squad Portfolio.

Work in this Project is coordinated with Program Element (PE) 0602105A (Materials Technology), PE 0602618A (Ballistics Technology), PE 0603001A (Warfighter Advanced Technology), PE 0602787A (Medical Technology Initiatives), and PE 0602716A (Human Factors Engineering Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Army Natick Soldier Research, Development, and Engineering Center (NSRDEC), Natick, MA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Soldier Blast, Ballistic, and Sensory Protection	5.042	6.858	13.452
Description: This effort supports the investigation of novel materials, component design, and material modeling to design and develop technologies that protect Soldiers against ballistic, blast, and directed energy threats. This effort utilizes a cross-disciplinary, human-focused approach to develop technologies which optimize tradeoffs in ballistic and blast protective component design. This effort is fully coordinated with PE 0602787A/Project FH2, PE 0602787A/Project VB3, PE 0602787A/Project 874, PE 0602618A/H80, PE0602105A/Project H84, PE0602716A/Project H70, PE 0603001A/Project J50, and PE 0603001A/Project FF6. This effort supports the Force Protection Soldier & Small Unit capability research and addresses the Army top challenge of easing overburdened Soldiers in small units.			
FY 2016 Accomplishments: Completed development of laboratory method of simulating and measuring forces and accelerations induced by blast overpressure on headborne equipment; investigated concepts for improving the above method through inclusion of a biofidelic			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602786A / *Warfighter Technology*	**Project (Number/Name)** H98 / *Clothing & Equipm Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
neck that provides accurate, gender-specific simulation of the dynamic mechanical behavior of the human neck to improve the validity of the results; continued development of head and torso protection concepts for small arms and fragment protection using novel materials and assembling approaches to reduce weight while maintaining/improving penetration performance; completed development of standardized methodology to assess anthropometric design (fit, area of coverage, and comfort) impacts on body armor system performance. ***FY 2017 Plans:*** Continue the development of the biofidelic neck model which will provide a more accurate simulation of the dynamic behavior of the human neck when encountering blast impacts; develop and validate novel fibers, textiles, and components that enhance ballistic protection performance in equipment while reducing Soldier thermal and weight burden; develop enhanced materials, components, and models that mitigate Soldier injuries from blunt impact to head and extremities; continue the development of materials, processes, experiments, and validation tools that reduce threat of injury to the head from ballistic penetration or behind-the-helmet blunt trauma. ***FY 2018 Plans:*** Will conduct experiments to determine the efficacy of a combat helmet ballistic test methodology tied to modeling capabilities that correlate results with behind helmet blunt trauma injury; investigate new energy absorbing materials and subsystem components for helmet blunt impact protection systems; mature casualty reduction assessment tools and modeling capability; conduct experiments on next generation fiber technologies and material processing techniques with potential for enhancing fiber strength and advancing ballistic protection at reduced weight; validate pixelated lens technology applied on a ballistic fragmentation eyewear lens platform with ability to respond and protect against point and broadband light sources; determine the ability to detect and locate exposure to non-visible laser sources and other threats; investigate high transmission laser eye protection technology and evaluation procedures; conduct experiments on hard armor torso protection ceramic and composite backing materials to explore significant weight reduction opportunities; fund research to investigate alternative or new test methods and corresponding modeling and simulation for torso protection.			
Title: Soldier Vision Protection and Enhancement ***Description:*** This effort focuses on the investigation of technologies that provide eye protection against battlefield threats. This effort supports the Force Protection Soldier and Small Unit capability research and addresses the Army top challenge of easing overburdened Soldiers in small units. This effort is fully coordinated with PE 0602787A/Project FH2, PE 0602787A/Project VB3, PE 0602787A/Project 874, PE 0602618A/H80, PE0602105A/Project H84, PE0602716A/Project H70, PE 0603001A/Project J50, and PE 0603001A/Project FF6. In Fiscal Year (FY) 18, this effort will be incorporated into this PE's Soldier Blast, Ballistic, and Sensory Protection Program. ***FY 2016 Accomplishments:***	2.820	3.100	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602786A / *Warfighter Technology*	**Project (Number/Name)** H98 / *Clothing & Equipm Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Designed breadboard proof of concept for pixilated lens technology that maintains peripheral vision while mitigating laser threats; investigated feasibility of alternative material solutions for tunable laser protection that enable selective blocking of laser threats while maintaining non-threatening light transmission; investigated feasibility of enhancing Soldier vision performance (e.g., on-demand telescopic vision capability) using waveplate technology. ***FY 2017 Plans:*** Investigate the application of the pixelated lens technology on a ballistic fragmentation eyewear lens platform; design proof of concept for enhanced Soldier vision and auditory system technology; conduct experiments to refine the ability to respond and protect against point and broadband light sources using a pixilated lens approach; investigate the ability to detect and locate exposure to non-visible laser sources and other threats; investigate how specific novel visual protective technologies impact visual acuity and Soldier perceptual capabilities and determine the impact on a wide range of Soldier tasks such as movement from indoor to outdoor environments, marksmanship, and move-shoot.			
Title: Measurement, Prediction, and Improvement of Soldier Performance ***Description:*** This effort provides a comprehensive investigation of human science methods (psychological, anthropometric, and psychophysical) and biomechanical models to assess human responses to sensory, physical, cognitive, and affective stimuli and stressors. This investigation supports the development of human systems design concepts for Soldier equipment and enhances Soldier and small unit physical and cognitive performance. This work is collaborative with the Army Research Laboratory PE 0602716A/H70 and the Medical Research and Materiel Command PE 0602787A/Project FH2, PE 0602787A/Project VB3, and PE 0602787A/Project 874. This effort supports the Force Protection Soldier & Small Unit capability research and addresses the Army top challenge of easing overburdened Soldiers in small units. ***FY 2016 Accomplishments:*** Continued the Soldier System Engineering Architecture (SSEA) development by verifying and initiating validation of the suite of human systems performance measurements, approaches, and field analytical tools that comprise the human systems building blocks of this framework; investigated the psychological, anthropometric, and biomechanical impacts on modifications to Soldier system components and sub-systems on survivability and combat effectiveness; investigated the concept of leveraging and linking existing Soldier capabilities with emerging modeling and analytical techniques to increase scientific rigor of Soldier system experiments that reduce risk and cost of system development while increasing Soldier and small unit performance; designed standard assessment methodologies, based on operational tasks, that define the relationship between Soldier performance and his/her equipment and configurations; designed population-level analysis design tool for creating human model of Soldier's size and shape based on statistical methods; defined a repeatable standard method for obtaining accurate three-dimensional (3D) models of equipped Warfighters to develop the ability to model any Warfighter size/shape, in any pose, with 3D gear and casualty estimation. ***FY 2017 Plans:***	8.510	9.459	7.863

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602786A / *Warfighter Technology*	**Project (Number/Name)** H98 / *Clothing & Equipm Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Study the effects of incorporating physical, cognitive, and social performance metrics into the SSEA human performance tools to identify their impacts on equipment and mission tasks; investigate emerging human science measures and metrics such as load mitigation, encumbered movement impact to mission performance, and assessment of physical and cognitive augmentation to increase understanding of human performance in a military environment; conduct experiments to increase understanding of factors that optimize human performance in biomechanics, anthropometry, and cognition measures; validate predictive data with Soldier performance tools and simulations. ***FY 2018 Plans:*** Will investigate the utility of non-invasive physical human performance metrics data collection with respect to specific Warfighter tasks; continue to conduct experiments that monitor, predict, and optimize cognitive, physical, and social measures of the Soldier; validate common criteria for measures of Soldier performance while conducting military relevant tasks; investigate the validity, reliability, and sensitivity of obstacles utilized within the Load Effects Assessment Program (LEAP); validate interactions and physical interfaces between the Soldier, equipment, and physical tasks; mature benchtop representation of the Warfighter's gut microbiome model to investigate and characterize the effects of dietary inputs on the performance of a Soldier's internal anatomy; fund research and conduct experiments to understand the physiological mechanisms necessary to advance a Soldier's natural physical and cognitive abilities.			
Title: Advancements in Fibers, Textiles, and Materials for Soldier Protection	10.513	7.154	6.135
Description: This effort focuses on the investigation of technologies and test methods that aid in the design and development of multifunctional protective materials for Soldier clothing and individual equipment. This effort includes the development and maturation of flame, thermal, environmental, and multispectral concealment capabilities, as well as novel desalinization and purification technologies for individual Soldier hydration, combat identification technologies, and electro-textiles for power generation and distribution. This effort supports the Force Protection Soldier and Small Unit capability research. This effort is fully coordinated with PE0602105A/Project H84, PE0602716A/Project H70, and PE 0603001A/Project J50. ***FY 2016 Accomplishments:*** Matured thermal signature reduction technologies and associated modeling tools for prediction of material performance in a range of simulated environments; continued to investigate incorporation of improved, low toxicity, narrow spectrum antimicrobial and insect repellent treatments into textiles appropriate for Soldier clothing and individual equipment; matured improved flame resistant and no melt/no drip fibers, coatings, and textiles for incorporation into combat clothing and individual equipment; continued development of improved combat identification technologies and electrotextiles for power generation/distribution and personal thermal management. ***FY 2017 Plans:*** Develop second generation materials and combat uniform components that significantly reduce Soldier thermal signature; investigate novel textile technologies to provide protection against microbes, insect-borne diseases, climate extremes, flame/			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602786A / *Warfighter Technology*	**Project (Number/Name)** H98 / *Clothing & Equipm Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
thermal threat, and microwave directed energy threats; continue maturation of improved Soldier combat identification technologies and electrotexiles for power generation/distribution and personal thermal management; investigate use of improved models and simulated skin samples for improved burn injury prediction of human skin; identify, design, and develop lightweight personal hydration and thermal management concepts to enhance dismounted Soldier performance in jungle/tropical environments. ***FY 2018 Plans:*** Will investigate and develop desalination capabilities for individual Soldier hydration systems; design and develop novel textile architectures and weaves to provide protection against microwave frequency hazards through reflection and scattering of directed energy threats; investigate quantum dots and novel film applications as possible mechanisms to improve combat identification; investigate and develop microrectenna arrays for Soldier worn combat identification and energy conversion; investigate thermally adaptive fibers and technologies which provide improved thermal protection in cold and extreme cold weather environments; investigate carbon based conductive fibers and flexible materials for incorporation into textiles for optimized Soldier worn energy distribution.			
Accomplishments/Planned Programs Subtotals	26.885	26.571	27.450

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602786A / *Warfighter Technology*	Project (Number/Name) H99 / *Joint Service Combat Feeding Technology*	

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
H99: *Joint Service Combat Feeding Technology*	-	3.290	4.919	5.051	-	5.051	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

This Project investigates and develops novel ration packaging, combat feeding equipment/systems, and advanced food processing technologies to prolong shelf-life. This Project also investigates technologies that detect food safety hazards on the battlefield and enhance quality, nutritional content, and the variety of food items in military rations. Efforts funded in this project support all Military Services, the Special Operations Command, and the Defense Logistics Agency. The Army serves as Executive Agent for this Department of Defense (DoD) program, with oversight and coordination provided by the DoD Combat Feeding Research and Engineering Board. Technologies developed within this effort transition to Program Element (PE) 0603001A/Project C07 for maturation.

Efforts in this Project support the Army Science and Technology Soldier/Squad Portfolio.

Work in this Project is fully coordinated with PE 0602787A (Medical Technology) and PE 0603001A (Warfighter Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this Project is led, performed, and/or managed by the Army Natick Soldier Research, Development, and Engineering Center (NSRDEC), Natick, MA, and this Project has collaborative efforts with the Army Research Institute for Environmental Medicine.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Joint Combat Feeding Technologies	3.290	4.919	5.051
Description: This effort designs and develops stabilization techniques and nutrient compositions to maximize the Warfighter's cognitive and physical performance while minimizing nutritional degradation to optimize the Warfighter's health on the battlefield. This effort investigates technologies in support of the Defense Health Agency Veterinary Services (DHA VS) to enhance field detection and identification capabilities of chemical and biological threats in foods. This effort supports the design and development of new threat detection tools and sensors for food inspectors. This effort additionally investigates equipment and energy technologies to expand the capability and reduce the logistics footprint of Joint Service field feeding operations in a wide range of environmental and operational contexts. This work is coordinated with PE 0602787A/Project 869 and PE 0603001A/ Project C07.			
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602786A / *Warfighter Technology*	**Project (Number/Name)** H99 / *Joint Service Combat Feeding Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Investigated alternate refrigerant systems in support of containerized deployable refrigeration assets to address environmental concerns with current generation refrigerants; investigated nutritional countermeasures through identification and stabilization of functional nutrients, such as dietary ketone esters, into shelf stable operational rations to improve recovery time from exertion or injury as well as provide potential systemic health benefits; investigated novel food processing technologies in support of improved nutrient retention, reduced manufacturing costs, and increased consumer acceptability; investigated and developed optimized sampling procedures in support of next generation diagnostic systems for food protection to increase the sensitivity and selectivity of field portable sensors for pathogenic bacteria and toxins. ***FY 2017 Plans:*** Explore ration nutritional strategies for components targeted at optimizing the gut microbiome to reduce gastrointestinal distress; investigate refrigeration technologies for reduced energy consumption and modularity; investigate ration compounds to promote recovery and optimize performance; research the detection, prevention, and reduction of pathogenic bacteria and toxins in foods; investigate novel self-repairing/heating packaging materials to enhance food protection and quality; explore technologies for three-dimensional printing of ration components. ***FY 2018 Plans:*** Will develop ration formulations containing proven nutritional strategies to optimize the gut microbiome and improve warfighter cognitive performance under stressful conditions; investigate heat transfer methods to enable high efficiency operation of field feeding appliances while reducing power requirements; identify nutritional interventions that promote recovery from strenuous exercise or mitigate oxidative stress; investigate portable biosensor detection platforms to improve food safety; design alternative packaging configurations that decrease ration weight; validate improved nutrient content of foods processed using non-thermal or low-thermal methods to improve warfighter nutritional status; develop model food formulations that retain desired sensory characteristics after creation via three-dimensional (3D) printing.			
Accomplishments/Planned Programs Subtotals	3.290	4.919	5.051

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602786A / *Warfighter Technology*	Project (Number/Name) VT4 / *Expeditionary Mobile Base Camp Technology*	

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
VT4: *Expeditionary Mobile Base Camp Technology*	-	1.688	2.481	3.240	-	3.240	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

This Project matures and validates fully integrated holistic expeditionary base camp (EBC) capabilities with mission-specific plug and play components, subsystems, and modules designed to optimize manpower requirements, enhance situational awareness, increase Soldier readiness and survivability, optimize habitation, reduce logistics footprint, enhance supportability, and reduce cost. EBC systems provide an operational capability for small combat units (battalion and below) and Soldiers in varying environments, which are rapidly deployable and re-locatable, require no Military Construction, and need limited materiel handing support. This Project matures technologies that can be combined to create mission specific lab demonstrators and develops metrics and methodologies to measure performance characteristics.

Efforts in this Project support the Army Science and Technology Soldier/Squad Portfolio.

Work in this Project is fully coordinated with Program Element (PE) 0602784A and 0603734A (Military Engineering Technology), PE 0603001A (Warfighter Advanced Technology), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603125A (Combating Terrorism Technology Development), and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this Project is led, performed, and/or managed by the Army Natick Soldier Research, Development, and Engineering Center (NSRDEC), Natick, MA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Expeditionary Base Camp Component Technologies	1.688	2.481	3.240
Description: This effort investigates base camp component interoperability and matures and scales component technologies for an integrated holistic base camp concept. This effort supports the basing sustainment and logistics capability investigation. This work is coordinated with PE 0603001A/Project VT5, PE 0602786A/Project H99 and is coordinated with PE 0602784A/Project T40, PE 0603734A/Project T08, PE 0603004A/Project L97, PE 0603005A/Project 497, PE 0603125A/Project DF5, and PE 0603772A/ Project 101.			
FY 2016 Accomplishments: Investigated increased flame resistance for shelter materials and fire safety for shelters to ensure Soldiers are provided with safe living environments; matured novel materials for power generating shelter materials to decrease logistical burden and fuel demands; researched rapid expeditionary basing deployment techniques to increase efficiency and support a leaner force;			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Army		Date: May 2017
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602786A / *Warfighter Technology*	**Project (Number/Name)** VT4 / *Expeditionary Mobile Base Camp Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
investigated technologies that support self-sufficiency of basing logistics; matured components of black waste systems to ensure a hygienic environment; designed lightweight novel multifunctional panel materials for rigid wall shelters; investigated multifunctional materials for basing applications that can produce increased protections for overmatch capabilities and reduce exposure to insects. ***FY 2017 Plans:*** Investigate tradeoffs between base camp efficiency, scalability, and Soldier quality of life for optimal readiness and minimal degradation to missions; conduct experiments on microscale alternative field service energy technologies to enable self-sufficient base camps that decrease the logistical burden and cost; investigate novel thermal insulation material and coating technologies for rigid wall tactical shelters to enhance shelter energy efficiency; investigate and design novel solutions to characterize and mitigate emerging ballistic threats to integrated shelter basing systems including potential reactive technologies to increase overmatch. ***FY 2018 Plans:*** Will identify operational effectiveness measures and explore correlation between expeditionary maneuver, base camp sustainment, and operational quality of life optimized for Soldier readiness in order to incorporate mission effectiveness into the development of self-sufficient base camp technology; investigate alternative energy technologies to improve efficiency, durability, and adaptability to a base camp environment; mature thermal insulation material to enhance energy efficiency for expeditionary shelter; investigate technical approaches for expeditionary structures to mitigate visual, thermal, and electromagnetic infrared signatures; validate ballistic protective shelter material and design technologies with simulated emerging threats; investigate concepts of additive manufacturing technologies for in-theatre shelter component fabrication to reduce overall logistics tail.			
Accomplishments/Planned Programs Subtotals	1.688	2.481	3.240

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A