Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602712A / *Countermine Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	-	25.329	27.223	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	52.552
H24: *Countermine Tech*	-	19.794	15.234	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	35.028
H35: *Camouflage & Counter-Recon Tech*	-	5.535	5.989	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.524
HB2: *COUNTERMINE COMPONENT TECHNOLOGY (CA)*	-	0.000	6.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.000

Note

In Fiscal Year (FY) 2020 this Program Element (PE) is realigned with continuity of effort to the following:
* PE 0602143A (Soldier Lethality Technology)
* PE 0602144A (Ground Technology)
* PE 0602145A (Next Generation Combat Vehicle Technology)

A. Mission Description and Budget Item Justification

This PE investigates, designs, and develops technologies to improve counter explosive hazard detection, signature management, and counter- sensor capabilities. Focus areas are sensor components, sub-components, and software algorithms to improve detection of mines and explosive threats; novel methods to defeat mines and explosive threats; and signature management technologies to reduce the reconnaissance capabilities of enemy forces. The technologies being investigated are for both mounted and dismounted applications. Project H24 (Countermine Technology) investigates state of the art counter explosive hazard technologies to accurately detect and neutralize threats with a high probability, reduce false alarms, and enable an increased operational tempo. Project H35 (Camouflage and Counter-Recon Tech) designs and develops advanced sensor protection, signature management, and deception techniques for masking friendly force capabilities and intentions.

Work in this PE is related to and fully coordinated with PE 0602120A (Sensors and Electronic Survivability), PE 0602622A (Chemical, Smoke and Equipment Defeating Technology), PE 0602624A (Weapons and Munitions Technology), PE 0602709A (Night Vision Technology), PE 0602784A (Military Engineering Technology), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603606A (Landmine Warfare and Barrier Advanced Technology), and PE 0603710A (Night Vision Advanced Technology).

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

Work in this PE is performed by the United States Army Futures Command.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army					Date: March 2019
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*			R-1 Program Element (Number/Name) PE 0602712A / *Countermine Systems*		
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	26.190	21.244	22.914	-	22.914
Current President's Budget	25.329	27.223	0.000	-	0.000
Total Adjustments	-0.861	5.979	-22.914	-	-22.914
• Congressional General Reductions	-0.017	-0.021			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	6.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.844	-			
• Adjustments to Budget Years	-	-	-22.914	-	-22.914

Change Summary Explanation

FY19 increase related to congressional add of $6 Million

FY20 decrease related to science and technology financial restructuring

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602712A / *Countermine Systems*	Project (Number/Name) H24 / *Countermine Tech*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
H24: *Countermine Tech*	-	19.794	15.234	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	35.028

Note

In Fiscal Year (FY) 2020 this Project will realign to:
Program Element (PE) 0602144A Ground Technology
* Project BL4 Countermine Technology)
PE 060145A Next Generation Combat Vehicle Technology
* Project BJ7 Detection of Explosive Hazards Technology

A. Mission Description and Budget Item Justification

This Project investigates, designs, and develops new technology components, sub-components, and software algorithms for detection, discrimination, and neutralization of individual mines, minefields, and other explosive threats. The goals of this Project are to accurately detect threats with a high probability, reduce false alarms, and enable an increased operational tempo.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Standoff Sensors for Explosive Hazard Detection	10.935	10.903	-
Description: This effort addresses the challenges of sensing and confirming potential in-road and roadside threats at standoff ranges. The effort focuses on understanding the phenomenologies that impact sensor design concepts and steer novel technologies that provide the primary means for detecting anomalies. The result is higher-confidence target detection and improved clutter/background filtering. Examples of candidate technologies include Forward Looking (FL) Electro-Optic/Infrared (EO/IR) and Ground Penetrating Radar (GPR) sensors, which are used to detect surface threats.			
FY 2019 Plans: Will design and validate novel sensors and processing approaches using advances in correlated FL and multistate GPR, vibration, and EO/IR sensors; will combine fused signal processing methods to better detect targets in the presence of clutter in the natural environment; will develop new processing techniques to improve detection capability of complementary sensors in varying environments; will investigate modular sensor components including unique radars, EO/IR sensors, wire detection techniques, and sensitive radio frequency technologies to remotely detect explosive hazards and indicators of emplacement such as command wires and initiation devices for application to small unmanned air and ground platforms.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602712A / *Countermine Systems*	**Project (Number/Name)** H24 / *Countermine Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
This research effort was realigned to PE 0602144A (Ground Technology) / Project BL4 (Countermine Technology) and PE 0602145A (Next Generation Combat Vehicle Technology) / Project BJ7 (Detection of Explosive Hazards Technology) in FY20 as part of the financial restructuring.			
Title: Dismounted Explosive Hazard Detection Technology ***Description:*** This effort investigates emerging component technologies to enhance detection of explosive hazards, including metallic and non-metallic landmines, Improvised Explosive Devices (IEDs), Home Made Explosives (HMEs), and Explosively Formed Penetrators (EFPs). Emphasis is on increased coverage area, higher detection rates, and increased discrimination probabilities. Technologies that provide low Size, Weight, and Power (SWaP) solutions are considered and studied to ensure solutions are viable for Soldier-portable applications. This effort also investigates advanced signal processing and detection algorithms for increased real-time feedback for threat detection and identification, and it collects data to inform studies investigating methods to reduce the operator's cognitive burden.	6.288	-	-
Title: Counter Explosive Hazard Phenomonology ***Description:*** This effort investigates potential long term solutions to nonconventional explosive hazard threats. It leverages recent lessons learned to investigate new ideas and emerging counter explosive hazard (CEH) technologies by gaining a better understanding of how to detect, neutralize, and mitigate the threat. The effort includes a series of innovative exploration and discovery events focused on the identification of new ideas and concepts in a structured and organized framework, enabling the Army to identify/investigate opportunities to leverage technologies traditionally associated with other arenas, such as the intelligence community, big data, and the financial industry.	2.571	-	-
Title: Neutralization and Breaching Technology ***Description:*** This effort addresses the challenges of selectively neutralizing individual explosive hazards at standoff ranges as well as the challenges of scaling up such capabilities to neutralize multiple explosive hazards for effective complex obstacle breaches. This effort focuses on validation of techniques to confirm the location of buried threats and on the design and development of technology components to defeat the confirmed target. The result is matured components to facilitate follow-on efforts to develop an integrated explosive hazard neutralization and breaching capability. Examples of candidate technologies for neutralization include high energy devices (lasers and radio frequency) and explosives. ***FY 2019 Plans:*** Will investigate standoff confirmation sensor techniques to determine discrimination thresholds and to set parameters for the design of neutralization techniques; will investigate laser, radio frequency, and microwave sources to determine maturity; determine options for use of explosive techniques. ***FY 2019 to FY 2020 Increase/Decrease Statement:***	-	3.900	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602712A / *Countermine Systems*	**Project (Number/Name)** H24 / *Countermine Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
This research effort was realigned to PE 0602144A (Ground Technology) / Project BL4 (Countermine Technology) and PE 0602145A (Next Generation Combat Vehicle Technology) / Project BJ7 (Detection of Explosive Hazards Technology) in FY20 as part of the financial restructuring.			
Title: FY 2019 SBIR / STTR Transfer ***Description:*** FY 2019 SBIR / STTR Transfer ***FY 2019 Plans:*** FY 2019 SBIR / STTR Transfer ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 SBIR / STTR Transfer	-	0.431	-
Accomplishments/Planned Programs Subtotals	19.794	15.234	-

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: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602712A / *Countermine Systems*				Project (Number/Name) H35 / *Camouflage & Counter-Recon Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
H35: *Camouflage & Counter-Recon Tech*	-	5.535	5.989	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.524

Note

In Fiscal Year (FY) 2020 this Project is being realigned to:
Program Element (PE) 0602145A Next Generation Combat Vehicle Technology
* Project BI2 Sensor Protection Technology

A. Mission Description and Budget Item Justification

This Project investigates, designs, and develops techniques for masking friendly force capabilities and intentions. The Project pursues technologies to reduce the susceptibility of sensor systems to detection and targeting by threat forces, as well as to inform the development of next generation camouflage coatings and paints. Novel technologies are investigated, such as novel optics designs combined with signal processing, spectral filtering, and threat sensing algorithms.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Camouflage and Counter-Reconnaissance Technology for Advanced Spectral Sensors	5.535	5.791	-
Description: This effort investigates and advances new techniques to reduce susceptibility of sensors to detection by lasers, Electro-Optic (EO) sensor systems, and Infrared (IR) sensor systems. This effort also researches signature reduction approaches for camouflage nets.			
FY 2019 Plans: Investigate new protective coatings for dual band IR systems that have high out of band rejection, very high in-band transmission, and laser durability while still meeting camera window environmental performance requirements; will continue to support signature characteristics testing for urban and arctic camouflage solutions for both vehicles and dismounted Soldiers.			
FY 2019 to FY 2020 Increase/Decrease Statement: This research effort was realigned to PE 0602145A (Next Generation Combat Vehicle Technology) / Project BI2 (Sensor Protection Technology) in FY20 as part of the financial restructuring.			
Title: FY 2019 SBIR / STTR Transfer	-	0.198	-
Description: FY 2019 SBIR / STTR Transfer			
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602712A / *Countermine Systems*	**Project (Number/Name)** H35 / *Camouflage & Counter-Recon Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
FY 2019 SBIR / STTR Transfer			
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer			
Accomplishments/Planned Programs Subtotals	5.535	5.989	-

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: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602712A / *Countermine Systems*	Project (Number/Name) HB2 / *COUNTERMINE COMPONENT TECHNOLOGY (CA)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
HB2: *COUNTERMINE COMPONENT TECHNOLOGY (CA)*	-	0.000	6.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.000

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Countermine Systems applied research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Congressional Increase	-	6.000	-
Description: Congressional increase. ***FY 2019 Plans:*** Congressional increase. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** NA.			
Accomplishments/Planned Programs Subtotals	-	6.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A