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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 2: Applied Research</i>					R-1 Program Element (Number/Name) PE 0602712A / <i>Countermines Systems</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	26.594	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.594
H24: <i>Countermines Tech</i>	-	14.803	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.803
H35: <i>Camouflage & Counter-Recon Tech</i>	-	5.791	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.791
HB2: <i>COUNTERMINE COMPONENT TECHNOLOGY (CA)</i>	-	6.000	0.000	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 (Countermines 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.

UNCLASSIFIED

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 2: Applied Research</i>	R-1 Program Element (Number/Name) PE 0602712A / <i>Countermine Systems</i>
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B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	27.223	0.000	0.000	-	0.000
Current President's Budget	26.594	0.000	0.000	-	0.000
Total Adjustments	-0.629	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.629	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602712A / <i>Countermine Systems</i>				Project (Number/Name) H24 / <i>Countermine Tech</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
H24: <i>Countermine Tech</i>	-	14.803	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.803

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 2019	FY 2020	FY 2021
Title: Standoff Sensors for Explosive Hazard Detection	10.896	-	-
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.			
Title: Neutralization and Breaching Technology	3.900	-	-
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.			
Title: FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.007	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602712A / <i>Countermine Systems</i>	Project (Number/Name) H24 / <i>Countermine Tech</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>Description:</i> FY 2018 NDAA SEC 825 MDAP Cost Overrun			
Accomplishments/Planned Programs Subtotals	14.803	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602712A / <i>Countermine Systems</i>				Project (Number/Name) H35 / <i>Camouflage & Counter-Recon Tech</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
<i>H35: Camouflage & Counter-Recon Tech</i>	-	5.791	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.791

Note

In Fiscal Year (FY) 2020 this Project is being realigned to:
 Program Element (PE) 0602145A Next Generation Combat Vehicle Technology
 * Project B12 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 2019	FY 2020	FY 2021
Title: Camouflage and Counter-Reconnaissance Technology for Advanced Spectral Sensors	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.			
Accomplishments/Planned Programs Subtotals	5.791	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

UNCLASSIFIED

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Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602712A / <i>Countermine Systems</i>				Project (Number/Name) HB2 / <i>COUNTERMINE COMPONENT TECHNOLOGY (CA)</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
HB2: <i>COUNTERMINE COMPONENT TECHNOLOGY (CA)</i>	-	6.000	0.000	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 2019	FY 2020	FY 2021
Title: Program Increase - Developing and Improving Counter-IED Sensors (CCDC) Description: Congressional increase.	3.100	-	-
Title: Program Increase - Development of Soil Parameters (USACE)	2.900	-	-
Accomplishments/Planned Programs Subtotals	6.000	-	-

C. Other Program Funding Summary (\$ in Millions)
N/A
Remarks

D. Acquisition Strategy
N/A