| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army | | | | | | | | | | | Date: March 2019 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Appropriation/Budget Activity**<br>2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)* | | | | | **R-1 Program Element (Number/Name)**<br>PE 0603606A *I Landmine Warfare and Barrier Advanced Technology* | | | | | | | |
| 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 | - | 18.473 | 17.097 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 35.570 |
| 608: *Countermine & Bar Dev* | - | 15.529 | 11.097 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 26.626 |
| 64C: *COUNTERMINE DEMONSTRATIONS (CA)* | - | 1.000 | 6.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 7.000 |
| 683: *Area Denial Sensors* | - | 1.944 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.944 |

**Note**

 In Fiscal Year (FY) 2020 this Program Element (PE) is being eliminated, with continuity of effort realigned to the following PEs:
 * PE 0603118A Soldier Lethality Advanced Technology
 * PE 0603462A NGCV Advanced Technology

**A. Mission Description and Budget Item Justification**

This PE matures and demonstrates sensors, subsystems, and neutralization technologies that can be used by dismounted forces as well as ground and air platforms to detect, identify and mitigate the effects of landmines, improvised explosive devices, minefields, and other explosive hazards. This PE also conducts modeling and simulation activities to assess the effectiveness of detection and neutralization concepts. Project 608 (Countermine and Bar Dev)supports the maturation and demonstration of enabling component and subsystems for counter explosive hazards and countermine technologies in the areas of countermine and barrier development and Project 683 (Area Denial Sensors) funds efforts on area denial sensors.

Work in this PE is fully coordinated with PE 0602120A (Sensors and Electronic Survivability), PE 0602622A (Chemical, Smoke and Equipment Defeating Technology), PE 0602624A (Weapons and Munitions Technology), PE 0602712A (Countermine Systems), PE 0602784A (Military Engineering Technology), PE 0603004 (Weapons and Munitions Advances Technologies), PE 0603270 (Electronic Warfare Technology), and PE 0603710A (Night Vision Advanced Technology).

All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.

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 U.S. Army Futures Command.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army | | | | **Date:** March 2019 | |
|---|---|---|---|---|---|
| **Appropriation/Budget Activity**<br>2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)* | | | **R-1 Program Element (Number/Name)**<br>PE 0603606A *I Landmine Warfare and Barrier Advanced Technology* | | |

| B. Program Change Summary ($ in Millions) | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 17.948 | 11.104 | 11.238 | - | 11.238 |
| Current President's Budget | 18.473 | 17.097 | 0.000 | - | 0.000 |
| Total Adjustments | 0.525 | 5.993 | -11.238 | - | -11.238 |
| • Congressional General Reductions | -0.010 | -0.007 | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | 1.000 | 6.000 | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.465 | - | | | |
| • Adjustments to Budget Years | - | - | -11.238 | - | -11.238 |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2018 | FY 2019 |
|---|---|---|
| **Project:** 64C: *COUNTERMINE DEMONSTRATIONS (CA)* | | |
| Congressional Add: *Countermine* | 1.000 | 6.000 |
| Congressional Add Subtotals for Project: 64C | 1.000 | 6.000 |
| Congressional Add Totals for all Projects | 1.000 | 6.000 |

**Change Summary Explanation**

FY19 congressional add ($6.000 million) for multi-sensor drone swarms for explosive hazard detection.
This PE is being terminated in FY20, with continuity of effort realigned to other PEs.

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army | | | | | | | | | | | Date: March 2019 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 3 | | | | **R-1 Program Element (Number/Name)**<br>PE 0603606A / *Landmine Warfare and Barrier Advanced Technology* | | | | | | **Project (Number/Name)**<br>608 / *Countermine & Bar Dev* | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 608: *Countermine & Bar Dev* | - | 15.529 | 11.097 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 26.626 |

**Note**

In Fiscal Year (FY) 2020 this Project is being realigned to:
Program Element (PE) 0603118A Soldier Lethality Advanced Technology, Project:
* BC9 Advanced Soldier Sensors/Displays Advanced Technology for Dismounts
PE 0603462A NGCV Advanced Technology, Project:
* BJ8 Detection of Explosive Hazards Advanced Technology

**A. Mission Description and Budget Item Justification**

This Project matures and demonstrates technologies for finding and neutralizing explosive hazards in varying vegetation, soil, and weather conditions both day and night. Activities include maturation and demonstration of modular, semi-autonomous, and autonomous air, ground, and Soldier borne technologies to enable standoff and close-in detection and neutralization of explosive threats. Efforts are supported by modeling and simulation assessments to define potential system effectiveness.

All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.

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.

| **B. Accomplishments/Planned Programs ($ in Millions)** | FY 2018 | FY 2019 | FY 2020 |
|---|---|---|---|
| *Title:* Ground Vehicle Explosive Hazard Detection<br><br>*Description:* This effort improves detection, marking, and defeat of low metal/low contrast explosive threats buried in the road and along the sides of roads, Improvised Explosive Devices (IEDs), and antitank landmines. This effort also matures technologies to increase standoff detection and defeat distances, both in roads and off routes, enabling faster rates of advance and safer operations for early entry and route clearance missions. | 15.529 | - | - |
| *Title:* Autonomous Explosive Hazard Detection<br><br>*Description:* This effort demonstrates an integrated modular sensor and sensor data processing capability to enable remote and semi-autonomous detection of mines, other explosive hazards, and indicators of emplacement, such as command wires and initiation devices from a safe standoff distance using small unmanned ground and air platforms. This effort also matures and demonstrates explosive hazard (EH) detection technologies that can be adapted to address near-peer threats in multiple environments. | - | 10.860 | - |

| **Exhibit R-2A**, **RDT&E Project Justification:** PB 2020 Army | | **Date:** March 2019 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 *I* 3 | **R-1 Program Element (Number/Name)**<br>PE 0603606A *I Landmine Warfare and Barrier Advanced Technology* | **Project (Number/Name)**<br>608 *I Countermine & Bar Dev* |

| **B. Accomplishments/Planned Programs ($ in Millions)** | **FY 2018** | **FY 2019** | **FY 2020** |
|---|---|---|---|
| *FY 2019 Plans:*<br>Mature sensors to detect wire components from standoff distances and sensor configurations for implementation on unmanned platforms; exploit novel sensor phenomenologies for optimization of explosive threat detection approaches; improve threat detection algorithms and signal processing techniques for the detection of buried explosive hazards using data collected in near-peer environments; mature low contrast target marking schemas and approaches; improve performance of close-in explosive threat confirmation sensors. | | | |
| *FY 2019 to FY 2020 Increase/Decrease Statement:*<br>This effort will be funded in PE 0603118A (Soldier Lethality Advanced Technology) / Project BC9 (Advanced Soldier Sensors/ Displays Advanced Technology for Dismounts) and PE 0603462A (NGCV Advanced Technology) / Project BJ8 (Detection of Explosive Hazards Advanced Technology) for FY 2020. | | | |
| *Title:* FY 2019 SBIR / STTR Transfer<br><br>*Description:* FY 2019 SBIR / STTR Transfer<br><br>*FY 2019 Plans:*<br>FY 2019 SBIR / STTR Transfer<br><br>*FY 2019 to FY 2020 Increase/Decrease Statement:*<br>FY 2019 SBIR / STTR Transfer | - | 0.237 | - |
| **Accomplishments/Planned Programs Subtotals** | 15.529 | 11.097 | - |

**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<br>2040 / 3 | | R-1 Program Element (Number/Name)<br>PE 0603606A / Landmine Warfare and<br>Barrier Advanced Technology | | | Project (Number/Name)<br>64C / COUNTERMINE<br>DEMONSTRATIONS (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64C: COUNTERMINE DEMONSTRATIONS (CA) | - | 1.000 | 6.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 7.000 |

## A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Countermine Advanced Technology and Demonstrations.

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 Project is performed by U.S. Army Futures Command (AFC).

## B. Accomplishments/Planned Programs ($ in Millions)

| | FY 2018 | FY 2019 |
|---|---|---|
| Congressional Add: Countermine | 1.000 | 6.000 |
| FY 2018 Accomplishments: Countermine | | |
| FY 2019 Plans: Countermine | | |
| Congressional Adds Subtotals | 1.000 | 6.000 |

## 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**<br>2040 / 3 | | | | **R-1 Program Element (Number/Name)**<br>PE 0603606A / *Landmine Warfare and Barrier Advanced Technology* | | | | | | **Project (Number/Name)**<br>683 / *Area Denial Sensors* | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 683: *Area Denial Sensors* | - | 1.944 | 0.000 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.944 |

**Note**

In Fiscal Year (FY) 2020 funding for Area Denial Sensors is realigned to:
Program Element (PE) 0603462A Next Generation Combat Vehicle Advanced Tech, Project:
* BG1 Sensors for Auto Oper and Survivability Adv Tech

**A. Mission Description and Budget Item Justification**

This Project matures and demonstrates surveillance and command and control technology components for anti-access area denial systems that inform maneuver elements and minimize the risk to non-combatants from exposure to anti-personnel landmines and related maneuver barriers. The technology includes distributed personnel surveillance systems and command and control systems to be used with human-in-the-loop threat confirmation. This Project uses modeling and simulation to evaluate new concepts and doctrine. This Project also matures and optimizes components and system architectures, and it validates components in field settings.

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

All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2018 | FY 2019 | FY 2020 |
|---|---|---|---|
| **Title:** Area Denial Sensors | 1.944 | - | - |
| **Description:** This effort matures and demonstrates networked sensor and sensor fusion technology efforts to provide detection, identification, and classification in support of remotely delivered sensor systems and area denial munitions. Key technologies to be matured and demonstrated include deployable multi-mode sensors, fused sensor information, and local area network communications to meet requirements for human-in-the-loop command and control. | | | |
| **Accomplishments/Planned Programs Subtotals** | 1.944 | - | - |

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

**D. Acquisition Strategy**
 N/A

| **Exhibit R-2A**, **RDT&E Project Justification:** PB 2020 Army | | **Date:** March 2019 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 *I* 3 | **R-1 Program Element (Number/Name)**<br>PE 0603606A *I Landmine Warfare and Barrier Advanced Technology* | **Project (Number/Name)**<br>683 *I Area Denial Sensors* |

**E. Performance Metrics**

 N/A