Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*					R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	30.687	27.204	22.806	-	22.806	24.018	22.042	24.509	24.460	Continuing	Continuing
608: *Countermine & Bar Dev*	-	25.818	24.684	22.806	-	22.806	24.018	22.042	24.509	24.460	Continuing	Continuing
683: *Area Denial Sensors*	-	4.869	2.520	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 decrease to support higher priority efforts.

A. Mission Description and Budget Item Justification

This program element (PE) matures components, subsystems and demonstrates sensor and neutralization technologies that can be used by dismounted forces and on ground and/or air platforms to detect, identify and then mitigate the effects of landmines, minefields, other explosive hazards and obstacles. This PE also conducts modeling and simulation activities to assess the effectiveness of detection and neutralization concepts. Project 608 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 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) and PE 0603710A (Night Vision 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 PE is performed by the Army Research, Development and Engineering Command (RDECOM)/Communications-Electronics Research, Development and Engineering Center (CERDEC), Fort Belvoir, VA.

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APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*			R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*		
B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	31.491	27.204	28.738	-	28.738
Current President's Budget	30.687	27.204	22.806	-	22.806
Total Adjustments	-0.804	0.000	-5.932	-	-5.932
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.804	-			
• Adjustments to Budget Years	-	-	-5.932	-	-5.932

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
608: *Countermine & Bar Dev*	-	25.818	24.684	22.806	-	22.806	24.018	22.042	24.509	24.460	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project matures and demonstrates counter explosive hazard technologies for finding and neutralizing surface and buried threats in varying vegetation, soil, weather and diurnal conditions. Activities include remote/standoff detection of individual explosive hazards and minefields and neutralization of explosive threats, landmines and minefields. This project also evaluates airborne explosive hazard detection sensors and fabricates them for lightweight plug-and-play use, on manned and Unmanned Aerial Systems (UASs) in mission specific applications. Efforts are supported by modeling and simulation assessments to define potential system effectiveness.

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.

This project supports Army science and technology efforts in the Ground, Soldier, Air and Command, Control, Communications and Intelligence portfolios.

Work in this project is performed by the Army Research, Development and Engineering Command (RDECOM)/Communications-Electronics Research, Development and Engineering Center (CERDEC), Ft. Belvoir, VA. Minefield neutralization efforts are closely coordinated with Navy/US Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Threat Detection and Neutralization for Route Clearance:	8.218	0.000	0.000
Description: This effort demonstrates capabilities to detect and neutralize surface and shallow buried threats on primary and secondary roads from tactical standoff ranges. ***FY 2012 Accomplishments:*** Conducted trade studies to establish system level options for neutralization of individual explosive devices and for mine fields; validated emerging high energy laser techniques to neutralize individual explosive hazards; substantiated evolving burst laser techniques to neutralize threats detected by primary sensors.			
Title: Explosive Hazard Detection for Manned and Unmanned Aerial Systems:	8.160	8.210	6.402
Description: This effort utilizes lessons learned from the Threat/Mine Detection for In Road Obstacles to provide manned and unmanned aerial systems (UASs) the capability to detect explosive threats, threat deployment activities, minefields and Home			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Made Explosives (HME). In FY13-14, this effort supports the Technology Enabled Capability Demonstration 3.b: Surprise/Tactical Intelligence Actionable Intelligence. ***FY 2012 Accomplishments:*** Integrated shortwave infrared (SWIR) into initial payload and integrated the payload on a manned aircraft; completed baseline aided target recognition (AiTR) integration and conducted initial flight testing in a relevant environment to baseline payload and AiTR detection performance; optimized payload from test data, performed final verification testing, specified and initiated build of a 3-band longwave infrared (LWIR) demonstrator; performed system design trade studies; conducted concept evaluation exercise with representative sensors. ***FY 2013 Plans:*** Fabricate and integrate a specialized sensor meeting size, weight and power (SWaP) requirements for the Pointer Upgraded Mission Ability (PUMA) small unmanned aerial vehicle (SUAV); mature and integrate baseline algorithm and threat cueing approaches. ***FY 2014 Plans:*** Will demonstrate the performance of the specialized sensor integrated on the PUMA SUAV in a relevant environment; validate and test the compatibility of the multi-spectral sensor developed for the Shadow Tactical Unmanned Aerial Vehicle (TUAV) with the communications architecture of the airframe and ground station.			
Title: Threat/Mine Detection for In Road Obstacles: ***Description:*** This effort advances ground penetrating radar (GPR) and metal detection (MD) technologies integrated onto vehicles to detect the evolving underbelly threats on primary and secondary roads. This effort leverages the technology results from forward looking radar technology investigations under the Threat Detection and Neutralization for Route Clearance effort. ***FY 2012 Accomplishments:*** Performed SWaP analysis and system tradeoff studies for potential sensor payloads for the Pointer Upgraded Mission Ability Unmanned Aerial Vehicle (PUMA UAV) and evaluated complimentary sensors for a ground-based platform; designed a 3-band imaging sensor compatible with a forward motion compensation pointer; evaluated aided target recognition approaches for compatibility with selected sensors; conducted concept evaluation exercises of representative air and ground-based sensors using mission scenarios in a relative environment.	9.440	0.000	0.000
Title: Ground Vehicle Explosive Hazard Detection ***Description:*** This project improves detection of buried low metal/low contrast explosive threats, such as Improvised Explosive Devices (IEDs), and antitank landmines and increases Rates of Advance (RoA). Improving the signal to noise ratio and acquisition rates reduces susceptibility to electromagnetic interference and improves the interoperability with electronic countermeasures,	0.000	13.474	13.385

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
while continuing to improve detection and reduce false alarms. Currently, Ground Penetrating Radar (GPR) capabilities for detection of explosive threats in an electronic warfare environment are limited by radar receiver technology and detection latency. This effort leverages the technology results from forward looking radar technology investigations under the Threat Detection and Neutralization for Route Clearance effort and Threat/Mine Detection for In Road Obstacles. ***FY 2013 Plans:*** Fabricate a ground vehicle based, three-band infrared sensor prototype and integrate onto a representative route clearance patrol vehicle; implement baseline algorithm and threat cueing approaches. Conduct bench-level tests and collect initial field data with the first multi-channel prototype digital GPR receiver array; incorporate technical improvements into the GPR design; build and begin evaluation of a full size four-panel GPR array; begin maturation of new target detection algorithms. ***FY 2014 Plans:*** Will integrate and demonstrate performance of initial full size four-panel digital GPR array with greater detection; integrate and demonstrate performance of ground vehicle based, forward looking electro-optical/infrared sensor; mature sensor fusion algorithms and cueing techniques to enable handoff of potential in-road threats detected in front of the vehicle to the on-board digital GPR for confirmation of threat locations to enable increased rates of advance during route clearance operations.			
Title: Dismounted Explosive Hazard Detection ***Description:*** This effort matures, fabricates and evaluates lab demonstrators based on two different technologies to improve dismounted forces' capability to detect IEDs and landmines. This effort develops an illumination capability and modifies target detection algorithms for integration into current prototype digital goggles. This will be a helmet mounted capability to aid the dismounted forces as they execute route clearance missions by improving detection of command initiation wires, trip wires and indicators of IED emplacement such as disturbed earth. A next generation handheld explosive hazard detector technology will also be developed and matured with improved IED detection capabilities and SWaP characteristics. The next generation handheld detector technology may be inserted into the current AN/PSS-14 Mine Detector as an upgrade or may be a new handheld detector. ***FY 2013 Plans:*** Conduct a forward operational assessment with the modified digital goggle demonstrators integrated during the Threat/Mine Detection for In Road Obstacles project; collect field data, evaluate performance and address Soldier feedback for additional hardware and detection algorithm development. Integrate novel hand held GPR and wideband metal detectors into demonstrators for data collections and explosive hazard detection algorithm improvements. ***FY 2014 Plans:***	0.000	3.000	3.019

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Will collect data in relevant environments using an improved digital night vision goggle with a new counter IED mode demonstrator and optimize target detection algorithms; demonstrate performance low/no-metal hand held buried explosive hazard detector against realistic IED and mine targets (including both metallic, non-metallic and command wire threat components) by integrating metal detector and ground penetrating radar technologies into a single system.			
Accomplishments/Planned Programs Subtotals	25.818	24.684	22.806

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
683: *Area Denial Sensors*	-	4.869	2.520	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project matures and demonstrates surveillance, command and control technology components for alternative area protection systems that minimize the risk of injury or loss to non-combatants from exposure to anti-personnel landmines (APLs). The technology includes distributed personnel surveillance systems and command and control systems to be used with man-in-the-loop overwatch fires. This project uses modeling and simulation to evaluate new concepts and modify doctrine. This project also fabricates components, as well as system architectures and conducts evaluations at the system level in field settings.

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.

This project supports Army science and technology efforts in the Ground and Command, Control, Communications and Intelligence portfolios.

Work in this project is performed by the Army Research, Development and Engineering Command (RDECOM)/Communications-Electronics Research, Development and Engineering Center (CERDEC), Fort Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Area Denial Sensors	4.869	2.520	0.000
Description: This effort provides demonstration of surveillance technology components for area protection systems that minimize the risk of injury or loss to non-combatants from exposure to anti-personnel landmines (APLs).			
FY 2012 Accomplishments: Continued the maturation and demonstration of the personnel detection system in an operationally relevant environment; validated the detection system components and sensor algorithm for the sensor detection and discrimination of combatants/non-combatants, and image processing for false alarm reduction.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Demonstrate a remote low power infrared system to search and track personnel with 360 degree coverage; extend these algorithms and sensors to vehicle detection and track; develop a cued day/night imaging sensor system with algorithms for automated detection and image capture.			
Accomplishments/Planned Programs Subtotals	4.869	2.520	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.