Exhibit R-2, PB 2010 Army RDT&E Budget Item Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research					R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems					
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	24.252	32.308	18.945						Continuing	Continuing
HB2: COUNTERMINE COMPONENT TECHNOLOGY (CA)	3.092	10.564	.000						Continuing	Continuing
H24: COUNTERMINE TECH	18.426	18.899	16.084						Continuing	Continuing
H35: CAMOUFLAGE & COUNTER-RECON TECH	2.734	2.845	2.861						Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) investigates and develops applied technologies to improve countermine, signature management, and counter-sensors capabilities. The focus is on sensor technologies to improve detection of mines and directed energy; ballistic methods to defeat mines; and signature management technologies to reduce recon capabilities of the enemies. This PE also supports DoD's Center of Excellence for Unexploded Ordnance which coordinates and standardizes land mine signature models; maintains a catalogue of mine signatures; supports the evaluation of mine detection sensors and algorithms; and working in conjunction with the US Army Engineering, Research and Development Center (ERDC), examines countermine phenomenology of surface and buried mines, and booby traps. This PE advances the state of the art in Countermine Technologies (project H24) and Camouflage and Counter Recon Technologies (project H35). Countermine Component technology (project HB2) funds congressional special interest items.

Work in this PE is related to and is fully coordinated with PE 0602120A, (Sensors and Electronic Survivability), PE 0602624A, (Weapons and Munitions Technology), PE 0602709A, (Night Vision Technology), PE 0602784A (Military Engineering Technology), PE 0603606A, (Landmine Warfare and Barrier Advanced Technology), PE 0603710A (Night Vision Advanced Technology), and the US Marine Corps.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

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; the US Army Corps of Engineers Research and Development Center (ERDC), Vicksburg, MS; and the Armaments Research, Development, and Engineering Center (ARDEC), Picatinny, NJ.

Exhibit R-2, PB 2010 Army RDT&E Budget Item Justification	DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems

B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	30.294	21.815	22.050	
Current BES/President's Budget	24.252	32.308	18.945	
Total Adjustments	-6.042	10.493	-3.105	
Congressional Program Reductions	.000	-.107		
Congressional Rescissions	.000	.000		
Total Congressional Increases	.000	10.600		
Total Reprogrammings	-5.297	.000		
SBIR/STTR Transfer	-.745	.000		

Change Summary Explanation

FY08 funding decrease due to transfer of Congressional adds for proper execution.

FY09 funding increase is due to Congressional adds.

FY10 decrease reflects the transfer of Countermine Phenomenology funds to PE 0602784A, project T40 and a reduction to support higher priority efforts.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems					PROJECT NUMBER HB2	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
HB2: COUNTERMINE COMPONENT TECHNOLOGY (CA)	3.092	10.564	.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Countermine Systems applied research.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Standoff Improvised Explosive Device Protection Program	3.092	4.650	.000	
Hawaii Undersea Chemical Military Munitions Assessment Plan (pending transfer to 643779)	.000	3.874	.000	
Spectroscoptic Materials Indentification Centrer	.000	.775	.000	
UXO Detection and Classification in Volcanic Soil Using an Integrated Fully Polametic GPR and Chemical Sensor Technology	.000	.969	.000	
SBIR/STTR	.000	.296	.000	
Total	3.092	10.564	.000	

C. Other Program Funding Summary ($ in Millions)

N/A

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, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems					PROJECT NUMBER H24	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
H24: COUNTERMINE TECH	18.426	18.899	16.084						Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this project investigate and develop new countermine technologies that use man-portable, ground-vehicular, and airborne platforms for detection, discrimination, and neutralization of individual mines, minefields, and other threats. The goal of this project is to detect threats with a high probability, reduce false alarms, and enable an increased operational tempo.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed by the Army Research, Development, and Engineering Command/Communications-Electronics Research, Development, and Engineering Center (CERDEC), Fort Belvoir, VA; the US Army Corps of Engineers Research and Development Center (ERDC), Vicksburg, MS; the Armaments Research, Development, and Engineering Center (ARDEC), Picatinny, NJ; and the CERDEC Intelligence and information Warfare Directorate, Fort Monmouth, NJ.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Department of Defense Unexploded Ordnance (UXO) Center of Excellence (UXOCOE): The Army serves as executive agent of the UXOCOE, which provides for the coordination of Unexploded Ordnance (UXO) across the Department of Defense (DoD) and serves as the focal point for research, development, testing and evaluation (RDT&E) UXO detection and clearance. In FY08, catalogued UXOCOE countermine, explosive ordnance disposal, humanitarian demining, range sustainment and munitions response technology programs and requirements; established a web-based reporting matrix to catalogue and disseminate requirements and technology information. In FY09, review requirements and technologies to identify opportunities for multiple Services/Components to leverage common requirements and/or technologies. In FY10, will analyze catalogued detection and clearance requirements and technologies to determine RDT&E shortfalls and leveraging opportunities.	.486	.484	.498	
Sensors for Explosive Detection: This effort investigates and develops short range standoff capability to detect traces of explosive compounds with a low false alarm rate.	1.930	.000	.000	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems	PROJECT NUMBER H24

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY08, evaluated emerging detection technologies and compared results to sensor metrics based upon the Training and Doctrine Command (TRADOC) requirement for detection of explosive compounds (e.g. sensor sensitivity, short time detection, explosive compound selectivity); investigated and evaluated promising technologies (e.g., use of laser induced breakdown spectroscopy to identify the explosive signature, behavior and concentration on small amount of compound) for explosives and weapon cache detection.				
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.429	.000	
Phenomenology Sensors: This effort investigates and evaluates the key geo-environmental parameters such as weather conditions, soil composition, soil moisture, soil electromagnetic properties, and ground cover that affect mine/minefield detection and false alarm rates. In FY08, extended the electro-optic/infrared (EO/IR) models in the countermine computational test bed to cover full minefield-sized images and selected urban areas; completed large scale validation for the EO/IR models; validated synthetic aperture radar electromagnetic model for small scale imagery. In FY09, extend synthetic aperture radar (SAR) and the electromagnetic models to full minefield-size images; validate large scale model that includes ground penetrating radar (GPR), SAR, and EO/IR for countermine system performance predictions in a variety of real world environments.	1.970	1.963	.000	
Anti-personnel/Anti-Tank Mine False Alarm Reduction: This effort investigates new sensor and signal processing component technology for ground based and airborne systems that provide the Warfighter inexpensive solutions to standoff mine/emerging threat detection while reducing false alarm rates. In FY08, investigated new sensor and signal processing component technology, (compact radar, electro-optic and standoff acoustic sensor technologies), for ground based systems to provide the Warfighter inexpensive solutions for standoff detection of the full spectrum of threats (artillery shells, explosively formed penetrators, underbody attacks, command detonated mines, traditional landmines) while on the move. In FY09, investigate and evaluate additional low cost sensor products and phenomenologies including multispectral electro-optical sensors/detectors, scalar and vector magnetometers and ground penetrating radars and select the best candidates for reducing false alarm rates and improving rate of advance. In FY10, will perform a comprehensive evaluation of the candidate sensors to assess the threat detection performance using the processor in a variety of operational conditions and will complete the phenomenology study and signal processing algorithm development.	4.367	5.849	4.682	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems	PROJECT NUMBER H24

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Standoff Explosive Compound Detection Technology: This effort investigates ground based detection and confirmation technologies of explosives compounds from tactically relevant standoff distances. In FY08, conducted preliminary surface signature studies to examine the behavior and lifetime of explosive residues on various surface types for use in the standoff detection program; designed and executed 3 field tests using hyperspectral imaging sensors for the detection, of explosive precursor compounds at standoff distances; investigated UV Resonance Raman spectroscopy for standoff detection applications. In FY09, expand studies in the areas of chemical, nuclear, and biosensors applied to the explosive detection problems; investigate standoff explosive compound detection technologies to selectively detect multiple explosives (RDX, TNT, C4, etc.) in both vehicle borne and stationary environments; investigate non-contact sensing techniques to extend standoff range. In FY10, will perform an explosive behavioral study on different surfaces under various environmental conditions; and will determine phenomenology of ground based and airborne detection systems for full spectrum of threats.	2.685	4.004	3.132	
Standoff Mine/Defeat Neutralization Technology: This effort investigates and evaluates the ability to pre-detonate and neutralize mines and emerging threats at tactically relevant standoff ranges. In FY08, investigated and evaluated the effects of a high power, long-pulse drilling laser on mines and other threats; measured and developed the power, energy and laser requirements for the drilling laser to determine its feasibility and practicality for use in neutralizing threats in varying surfaces, overburden, and buried conditions; designed and began enhancements to precision munitions that can be used for threat neutralization in existing and newly developed weapon systems. Identified, conducted tests, and evaluated technologies for the detection of surface, obscured, and buried threats. In FY09, improve standoff capability for threat neutralization by investigating and developing advanced directed energy techniques and/or explosively formed munitions to achieve increased accuracy with reduced collateral damage and logistics burden. In FY10, will develop and evaluate a brassboard for laser drilling technologies and a brassboard for munitions against buried and obscured threats.	6.988	6.170	7.772	
Total	18.426	18.899	16.084	

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems	PROJECT NUMBER H24

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, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research				R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems					PROJECT NUMBER H35	
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
H35: CAMOUFLAGE & COUNTER-RECON TECH	2.734	2.845	2.861						Continuing	Continuing

A. Mission Description and Budget Item Justification

Efforts in this project evaluate and develop advanced signature management and deception technologies for masking friendly force capabilities and intentions. Technologies pursued under this effort include measures to reduce the optical cross section of the third generation dual band forward looking infrared (FLIR) both intrinsically within the detection/dewar and externally in the sensor system. Technologies investigated include the decentered field lens, wavefront coding, and spectral filtering and threat sensing algorithms.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

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

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Protection for Third Generation Sensors: The goal of this effort is to design, research, and evaluate advanced signature management and deception technologies for masking friendly force capabilities. In FY08, selected dual band sensor technologies for a threat sensing algorithm assessment. In FY09, evaluate and select algorithm based upon prior analysis and measurement performance. Down select technologies for investigation and fabrication of reduced signature third generation FLIR breadboard.	2.252	2.296	.000	
Camouflage and Counter-Recon Tech for Advanced Spectral Sensors: This effort investigates and advances new technologies to reduce susceptibility of sensors and extends camouflage technology. In FY08, selected 3-D target geometry model and generated or adapted first 3-D computer model for use in Spectral Camouflage Optimization of Patterns (SCOOP) optimizations; made appropriate modifications to SCOOP to permit use of 3-D target geometry; continued database development for backgrounds and coatings; evaluated means of utilizing satellite spectral data in lieu of ground-to-ground data. In FY09, generate 3-D camouflage patterns, including visible and near infrared/shortwave infrared/mid wave infrared/ longwave infrared signatures for at least one target; test in a virtual environment; and continue database development for backgrounds and coatings of 3-D camouflage patterns.	.482	.484	2.861	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 2040 - Research, Development, Test & Evaluation, Army/BA 2 - Applied Research	R-1 ITEM NOMENCLATURE PE 0602712A Countermine Systems	PROJECT NUMBER H35

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY10, will investigate the advanced signature reduction approaches for uncooled and dual band staring sensors and other staring sensors; will investigate the susceptibility of foreign and friendly systems to hyperspectral detection methods; and will develop near-term improvements to camouflage paints, coatings, and systems in both the visible and non-visible wavelength regions.				
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.065	.000	
Total	2.734	2.845	2.861	

C. Other Program Funding Summary ($ in Millions)

N/A

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.