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 0602784A MILITARY ENGINEERING TECHNOLOGY					
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	55.216	58.810	54.818						Continuing	Continuing
H71: Meteorological Research for Battle Command	6.629	6.705	5.656						Continuing	Continuing
T40: MOB/WPNS EFF TECH	17.458	17.750	20.445						Continuing	Continuing
T41: MIL FACILITIES ENG TEC	4.181	4.416	4.404						Continuing	Continuing
T42: Terrestrial Science Applied Research	4.520	4.752	5.555						Continuing	Continuing
T45: ENERGY TEC APL MIL FAC	3.231	3.198	3.263						Continuing	Continuing
T48: Center for Geosciences & Atmospheric Research	1.933	1.594	.000						Continuing	Continuing
T53: Military Engineering Applied Research (CA)	2.782	5.323	.000						Continuing	Continuing
855: TOPOGRAPHICAL, IMAGE INTEL & SPACE	14.482	15.072	15.495						Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) provides military engineering technologies. Research is conducted that supports special requirements for battlefield visualization, tactical decision aids, weather intelligence products, and capabilities to exploit space assets. Results are tailored to support the materiel development, test, and operations communities in evaluating the impacts of weather, terrain, and atmospheric obscurants on military materiel and operations. Major research efforts focus on: advanced distributed simulation including networking of models, complex data interchange, and collaborative training; military engineering including improving airfields and pavements, sustainment and cold regions engineering, vehicle mobility modeling, and reduced logistics footprint at base camps; facilities engineering including simulation of infrastructure capabilities for force projection, protection, and readiness; and geospatial research and engineering including terrain awareness. This research improves the efficiency and cost effectiveness of supporting the training/readiness/force projection

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missions in garrison and force sustainment missions in theaters of operation. Research is transitioned to PE 0603734A (Military Engineering Advanced Technology), PE 0603125A (Combating Terrorism, Technology Development), and to Project Managers (PM) such as PM Force Projection and Project Director, Combat Terrain Information Systems.

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.

The work in this PE is being performed by the US Army Engineer Research and Development Center, Vicksburg, MS, and the Army Research Laboratory, Aberdeen Proving Ground, MD.

B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	58.693	52.066	53.087	
Current BES/President's Budget	55.216	58.810	54.818	
Total Adjustments	-3.477	6.744	1.731	
Congressional Program Reductions	.000	-.196		
Congressional Rescissions	.000	.000		
Total Congressional Increases	.000	6.940		
Total Reprogrammings	-3.063	.000		
SBIR/STTR Transfer	-.414	.000		

Change Summary Explanation

FY09 funding increase is due to Congressional adds.

Exhibit R-2a, PB 2010 Army RDT&E Project Justification								DATE: May 2009		
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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**
H71: Meteorological Research for Battle Command	6.629	6.705	5.656						Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this project is to perform applied research for tactical weather and atmospheric effects algorithms, and for the integration of battlefield atmospheric environment simulations. The Army's transformation plan to the future force requires capabilities for battlefield commanders to make decisions based on tactical weather technology and impacts. This weather intelligence data must not only be accurate and timely, but distributed down to the lowest levels of command, which may include the individual Soldier. This project accomplishes this mission by transitioning technology to the Program Manager, Distributed Common Ground Station-Army (DCGS-A) through the integrated meteorological system (IMETS), through support to the Project Manager for Target Identification and Meteorological Systems (PM-TIMS) for field artillery systems, and to the Department of Defense (DoD) modeling community. It provides detailed model applications for various effects of the atmosphere on electro-optical and acoustic target detection, location, and identification. This project devises both physics-based decision aids and rule-based expert systems for assessing the impacts of weather on a very broad spectrum of friendly and threat weapons systems, sensors, platforms, and operations. These can be applied for mission planning, battlefield visualization, optimum weather sensor, and reconnaissance surveillance target acquisition (RSTA) sensor placement; route planning to maximize stealth and efficiency, tactical decision aids, and modeling and simulation of weather impacts for combat simulations and war games. This project supports the Army's transformation to the future force through future applications and platforms that support echelons at Brigade and below, down to the individual Soldier, weather/atmospheric impacts on sensor systems, and on-scene weather sensing and prediction capability.

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 Laboratory (ARL) located at Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Determine critical value thresholds for weather impacts on systems for tactical decision aids. Devise technology to improve environmental awareness of autonomous and semi-autonomous systems using bio-inspired approaches. In FY08, employed automated aviation weather routing tool (AWRT) UAS flight optimization capability enabling automated route adjustments based on atmospheric effects. In FY09, devise an acoustic model predicting effects of urban structures on detection and avoidance. Explore machine-to-machine options for autonomous flight control to eliminate need for the man-in-the-loop. Devise web-enabled decision aid capability for hosting on battlefield systems to enhance data availability in a net-centric environment. Integrate night-time	2.089	2.100	1.707	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
illumination model improvements into Tri-Service Target Acquisition Weapons Software (TAWS) to improve prediction of target acquisition. Devise bio-inspired technologies to protect small sensor platforms from environmental hazards, to aid in the location and navigation around hazards, and to locate sources based on environmental cues. Investigate use of ultrasonic detection and ranging technology to measure wind profiles to enhance sniper accuracy and to locate objects in low visibility. In FY10, will integrate acoustic detection algorithms into AWRT and verify the light urban model effects (LUME) integrated into TAWS to extend the capability to environmental effects in applications. Will devise a simulated bio-inspired environmental awareness capability for improving the survivability and effectiveness of autonomous and semi-autonomous vehicles that can be demonstrated using simulation techniques and archetyped on bench level systems.				
Develop new high resolution, short-range forecasting capability and high resolution urban diagnostic modeling capability: In FY08, integrated a complete weather running estimate-nowcast (WRE-N) capability for DCGS-A that supports the fidelity and timeliness of the forecasts. Evaluated the use of weather research and forecasting (WRF) model as part of the local analysis and prediction system (LAPS) package within the WRE-N system for improved ability to ingest data from both conventional and non-traditional sources. In FY09, formulate new methods to use microscale model output for critical micro-unmanned aircraft system (UAS) flight parameters that can improve launch, operation, and recovery of UAS assets. Research, design, and apply high resolution meteorological model improvements that account for fine scale structure in the urban boundary layer for an improved capability for predicting atmospheric effects. In FY10, will complete a dynamic weather data assimilation package for WRE-N and couple a diagnostic Microscale model such as 3D wind field (3DWF) to provide high resolution meteorological sources for weather products and applications. Will improve the physics and computational accuracy of the 3DWF model by applying an immersed boundary approach and parameterization of unresolved turbulence to better model the effects of complex steep topography such as mountains and high-rise buildings in urban terrain.	2.560	2.544	2.269	
Devise models to improve prediction of atmospheric conditions in urban and complex terrain that integrate high resolution boundary layer meteorological (MET) measurements. Verify high resolution boundary layer models with field measurements. In FY08, prepared a microscale wind model for urban domains initialized with WRE-N and WRF model output with computationally efficient data assimilation methods. Investigated the capture efficiency of single particle aerosol extraction technologies and explored urban field measurement data against urban wind flow predictive models.	1.980	2.061	1.680	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY09, apply stable boundary layer research to improve existing high resolution boundary layer meteorological models. Deliver a database of detailed high resolution MET measurements including wind flow around a small set of buildings for verification and improvement of urban MET models. Devise an improved urban dust and smoke obscuration model (UDSOM) for electro-optical transmission effects of urban dust and smoke for use in infantry combat simulations. Simulate and evaluate use of a microscale wind model as an integrated part of the DCGS-A weather system. Devise and integrate a Doppler LIDAR analysis toolkit (DLAT) for semi-autonomous data assimilation and processing. In FY10, will complete and demonstrate the DLAT for improving the effectiveness of real-time LIDAR data. Will investigate receiver arrays for remote sensing LIDAR. Will investigate two-wavelength laser induced fluorescence spectra of aerosols, analyze chemical and biological assays of aerosols to improve environmental monitoring of soldier health and enhance force protection. Will verify the accuracy and generalize the UDSOM to extend its use in mission planning as well as combat simulations.				
Total	6.629	6.705	5.656	

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 0602784A MILITARY ENGINEERING TECHNOLOGY					PROJECT NUMBER T40	
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**
T40: MOB/WPNS EFF TECH	17.458	17.750	20.445						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will develop technologies for overcoming battlespace gaps (such as cliffs, ravines and other natural obstacles) through prediction, definition, avoidance, or defeat; for expedient force protection during contingency operations; and for rapid port enhancement. This research supports development of the future force by providing physics-based representations of mobility, obstacle and barrier placement, survivability, and weapons effects in urban terrain modeling and simulation. Additionally, the project develops and assesses technologies that increase the survivability of critical assets from conventional and terrorist weapons, and maneuver support of deployed forces, while reducing their logistical footprint.

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 US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Maneuver Support/Gap Defeat/scalable Weapons Effects: In FY08, participated in Multi Threat Objective Projectile (M-TOP) redesign using the ERDC-developed, DOD-accredited penetration model, PENCRV3D. Participated in the M-TOP integrated demonstration by providing the instrumented structural target and weapons effects analysis. Future Force Breaching in MOUT: In FY09, determine blast effects from multi-output explosive and coupled reactive materials, penetration performance of novel weapons geometries, and numerical simulations of blast, fragmentation and structural target debris. In cooperation with Armament Research, Development and Engineering Center (ARDEC), develop and transition a lightweight, single-stage explosive wall breaching system to Project Manager Close Combat Systems (PM-CCS) for system development and demonstration. In FY10, will demonstrate warhead technologies for rapid wall breaching (RWB) that can create a man-sized hole in a double-reinforced concrete wall in a single step, reducing time on target and enhancing Soldier survivability. Will demonstrate multi-purpose shoulder launched munitions (SLM) which can incapacitate personnel within bunkers behind 12 inch triple brick and 8 inch double reinforced concrete walls. Will complete evaluations of multi-phase low-to-high	2.453	1.707	5.107	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
order detonation-blast effects against urban walls, conduct perforation tests against ultra-high strength concrete panels with current and advanced weapon designs, and characterize advanced materials.				
Near Surface Computational Testbed: This effort develops a physics-based, multiscale numerical testbed for virtual testing of unmanned systems (UMS) for intelligent autonomous navigation and tactical behaviors. In FY10, will provide sophisticated innovative physics models for disturbed soil phenomenology. Will develop Joint Architecture for Unmanned Systems (JAUS) compliant components for performance evaluations during mission simulations in complex environmentally enriched models.	.000	.000	6.479	
Adaptive Protection: In FY08, created novel layered protective materials to defeat 50-caliber arms and developed procedures for numerical evaluation of protective materials through multi-scale modeling. Developed target recognition (TR) for tunnel and tunneling activity detection for use by Joint Task Force North in their interdiction mission. In FY09, design and assess protective systems and retrofits to defeat large caliber rockets, light artillery, and 50-caliber arms. Develop sensor/geophysical algorithms for disturbed material signatures to be utilized by sensors that detect buried objects. Commence development of tunnel sensor fusion algorithms and of real time analysis techniques for tunnel sensor performance assessment. Using the computational protection testbed, assess expedient protection against artillery and missiles. In FY10, will develop interim lightweight rapidly erected protective systems for use inside and outside base perimeters to defeat emerging weapons effects. Will develop the capability to accurately predict vehicle loadings due to subsurface explosive detonations to increase the survivability of the current and future tactical wheeled vehicle fleet by providing protection with significant weight savings	6.433	6.979	8.398	
Geospatial Research and Engineering Support: In FY08, created an urban tactical decision aid for planning the best mix of infantry and small unmanned ground vehicles for clearing a building. In FY09, begin to develop bridging analysis tactical decision aid (TDA) for determining necessary bridging assets to conduct gap crossing and eliminate solutions, and will support geospatial battle management language (GEOBML) syntax in support of the Battlespace Terrain Reasoning and Awareness Battle Command (BTRA-BC) efforts. In FY10, will complete development of a bridging analysis TDA for determining necessary bridging assets to conduct gap crossing and defeat solutions.	1.660	1.210	.461	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Austere Entry and Maneuver: In FY08, provided technical support to develop designs that enable final fabrication and/or modifications as necessary for the lightweight modular causeway system (LMCS) to be tested in a controlled field environment, including two full-scale LMCS sections and the Joint Enable Theater Access-Sea Ports of Debarkation (JETA-SPOD) analysis tool. Provided scientific expertise to monitor fabrication of the systems and provided quality assurance/quality control for the full-scale LMCS and provided design details and drawings for an emplacement and recovery system to be used on multiple launch platforms for the LMCS test series. In FY09, provide technical expertise to support Joint Capability Technology Demonstrations (JCTD) user evaluations and provide guidance and training to military units selected to test and evaluate the LMCS residuals. The residuals will include an emplacement and recovery system, two sections of LMCS (approximately 100 feet), and the associated mooring system. Develop and assess design modifications for the LMCS that arise from this series of tests and provide these design modifications to the Transition Manager.	6.912	7.854	.000	
Total	17.458	17.750	20.445	

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 0602784A MILITARY ENGINEERING TECHNOLOGY					PROJECT NUMBER T41	
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**
T41: MIL FACILITIES ENG TEC	4.181	4.416	4.404						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will deliver sustainable, cost efficient and effective facilities; and provide installation operations. The project focuses on facilities and operations technologies directly supporting training, readiness, force projection, force protection, homeland security, and urban operations. Facility enhancement technologies contribute to cost reductions in the Army facility life cycle process (infrastructure planning, assessment, design, construction, revitalization, sustainment, and disposal), and the supporting installation operations. This work improves the ability of installations to support forces to meet transformation goals, improves designs for close battle training facilities, and enhances security of Soldiers, families, and civilians. Technologies evolving from this work include integrated planning and design tools for US facilities and forward bases, models predicting airborne dispersed contaminant effects on facilities and occupants; sustainable facility management; and collaborative decision support. In addition, technologies from this work will support analysis of cultural and facility issues in urban operations.

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 US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Facility Modeling and Simulation: In FY08, developed methods to enable units to rapidly understand local societal power relations and anticipate local responses for stability, security, transition, and reconstruction operations in heterogeneous communities. Developed molecular models for sorption kinetics using dynamic, atom-by-atom buildup of contaminant on aged pipe-wall. Developed reaction kinetics in chlorinated/chloraminated water using computational chemistry models applied to the contaminant alone. In FY09, develop analysis and predictive capabilities to enable units to gain cultural competence relevant to their mission. Develop rate constants of uptake of contaminates on pipe wall, based on results of the dynamic models using static representation of the contaminant alone. In FY10, will provide framework for integrated ontology for facility life-cycle model.	2.643	2.367	1.590	
Facility Engineering:	1.538	2.049	2.814	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY08, completed molecular design for a 1-million psi carbon-nanotube-based macro filament. In FY09, develop and validate predictive models and algorithms for durability of fiber reinforced polymer (FRP) composites for facilities and equipment, based on mechanisms of deformation and degradation. Also, devise molecular polarity maps for contaminant compounds using computational chemistry models. Synthesize a 1-million psi carbon-nanotube-based filament at the macro-scale. In FY10, will conduct assessment of material enhancement using self healing technologies.				
Total	4.181	4.416	4.404	

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 0602784A MILITARY ENGINEERING TECHNOLOGY					PROJECT NUMBER T42	
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**
T42: Terrestrial Science Applied Research	4.520	4.752	5.555						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will provide Warfighters with timely understanding of the physical environment's effect on personnel, platforms, sensors, and systems in order to develop improved tactics, techniques, procedures, and plans that ensure information superiority, situational awareness, and force projection. Specifically, this project seeks solutions for minimizing or eliminating the adverse effects of dynamically changing terrain states on sensing capabilities, engineer construction, and tactical maneuver conducted by the Army. To achieve this, effective decision-making tools such as models, simulations, and mission planning and rehearsal factors are required that accurately predict the state of the ground, near-surface atmospheric conditions, and system performance in complex environments.

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 US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Terrain State: In FY08, established and validated approaches such as real-time analysis techniques for sensor performance to greatly improve computational efficiency for carrying out terrain-state calculations. In FY09, assess the use of risk-based analyses in employing terrain-sensitive platforms and sensor mixes operating in harsh, complex environments with accompanying uncertainty about the physical environment. In FY10, will develop algorithms to interpret local terrain characteristics from on-board vehicle sensors (tactile and stand-off) through real-time terrain characterization for on-board mission decision logic to assure the tactical mobility of manned and unmanned ground vehicles on complex terrain.	2.852	2.744	1.795	
Signature Physics: In FY08, designed and evaluated tactical decision aids supporting multi-mode sensor missions with templates of geo-environmental effects. Developed algorithms to identify disturbed soil signatures based on sensor modality and geo-environment.	1.668	2.002	3.760	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY09, design and evaluate sensor data fusion aids based on predicted environmental effects for incorporation into geo-precise software tools; and implement infrared and acoustic sensor performance algorithms. In FY10, will build geo-precise software tools incorporating awareness about the physical environment (known and unknown) to optimize sensor emplacement and selection of sensor asset mixes.				
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.006	.000	
Total	4.520	4.752	5.555	

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 0602784A MILITARY ENGINEERING TECHNOLOGY					PROJECT NUMBER T45	
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**
T45: ENERGY TEC APL MIL FAC	3.231	3.198	3.263						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will provide technologies necessary for secure, energy efficient, sustainable military installations, emphasizing energy and utility systems protection in response to evolving needs. Energy technologies and processes are also applied to the Army's industrial base to maintain its cost-effective readiness for munitions production, training, and in the theater of operations to reduce logistical footprint. In addition, technologies from this work provide a better understanding of the battlespace environment as it relates to critical infrastructure.

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 preformed by the US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Installation Modeling and Simulation: In FY08, developed analysis tools capable of identifying and summarizing a utility network's impact on military operations in urban terrain (MOUT).	1.444	.000	.000	
Systems Response to Threats: In FY08, developed predictive models and algorithms making use of activation energies for deformation and degradation mechanisms based on chemistry (moisture absorption, hydro-thermal effects and crack growth) for prediction of mechanical properties and durability of fiber reinforced polymer (FRP) composites for facilities and equipment. In FY09, evaluate and test simulation algorithms based on failure modes and mechanistic models under interactive conditions. Develop nanotechnology based detection and identification of targeted multiple contaminants in near-real-time for detect-to-warn sensing in mission critical facilities. In FY10, will predict nanosensing complex stability under long term storage conditions. This will involve evaluating the stability of fluorescent nanoparticles, conjugated with antibodies, at various temperatures and in different environments.	1.787	3.184	3.263	
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.014	.000	
Total	3.231	3.198	3.263	

Exhibit R-2a, PB 2010 Army RDT&E Project Justification		DATE: May 2009
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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 0602784A MILITARY ENGINEERING TECHNOLOGY					PROJECT NUMBER T48	
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**
T48: Center for Geosciences & Atmospheric Research	1.933	1.594	.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Geosciences/Atmospheric Research.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Geosciences/Atmospheric Research	1.933	1.549	.000	
SBIR/STTR	.000	.045	.000	
Total	1.933	1.594	.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 0602784A MILITARY ENGINEERING TECHNOLOGY					PROJECT NUMBER T53	
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**
T53: Military Engineering Applied Research (CA)	2.782	5.323	.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Military Engineering applied research.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Airborne Threats	1.237	1.454	.000	
Nano-Crystalline Cement for High Strength, Rapid Curing Concrete with Improved Blast Resistance	1.545	1.395	.000	
Cellulose Nanocomposite Panels for Blast and Ballistic Protection	.000	2.325	.000	
SBIR/STTR	.000	.149	.000	
Total	2.782	5.323	.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 0602784A MILITARY ENGINEERING TECHNOLOGY					PROJECT NUMBER 855	
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**
855: TOPOGRAPHICAL, IMAGE INTEL & SPACE	14.482	15.072	15.495						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project will provide novel and innovative technologies for managing, transforming, updating, improving, and disseminating extremely large volumes of terrain and weather effects data at, or near, real-time and dynamic analysis and reasoning of this data to enable future force command and control systems with superior knowledge of the battlespace terrain and environment. Work in this project significantly enhances the Army's geospatial data management and dissemination capabilities. Weather and atmospheric data is provided for this project through the Army Research Laboratory efforts funded in PE 0601102A, project 52C and PE 0602784A, project H71.

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.

The work in this project is performed by the US Army Engineer Research and Development Center (ERDC), Vicksburg, MS.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Data Analysis: In FY08, developed a state of the art model for evidential reasoning that incorporates terrain and cultural conditions. In FY09, develop reasoning tools to include ability to connect to a Brigade Combat Team. In FY10, will evolve evidential reasoning model(s) from standalone to reachback services.	6.354	6.569	6.811	
Small Business Innovative Research/Small Business Technology Transfer Programs	.000	.120	.000	
Terrestrial Data Generation: In FY08, developed suitable nanomaterial reporters for Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) and measured detection thresholds for optical and chemical resistance reporters. In FY09, model nanomaterial efficiency by Light detection and Ranging (LIDAR) equation under various environmental conditions. In FY10, will empirically test optical reporting as remote sensors.	2.408	2.484	2.567	
Data Generation and Management: In FY08, developed and refined tools to correlate and fuse geospatial data from various sources (including tactical sensors and other sources) into a common geospatial database that supports multiple applications.	5.720	5.899	6.117	

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 0602784A MILITARY ENGINEERING TECHNOLOGY	PROJECT NUMBER 855

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY09, develop tools and techniques to improve the speed and accuracy to create orthophotos and support change detection. In FY10, will develop tools and techniques to exploit Buckeye, airborne and terrestrial LIDAR, and other sensor data, including bare earth digital elevation derivation, automated feature extraction, forest and tree canopy, and modeling extracted data into effective, realistic three-dimensional representations.				
Total	14.482	15.072	15.495	

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.