

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY		PE NUMBER AND TITLE					
2 - Applied Research		0602784A - MILITARY ENGINEERING TECHNOLOGY					
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
Total Program Element (PE) Cost	50817	58693	52066	53087	53773	55249	56699
855 TOPOGRAPHICAL, IMAGE INTEL & SPACE	11154	14622	15122	15809	16562	17494	18433
H71 ATMOSPHERIC INVESTIG	6701	6632	6728	6961	7016	7172	7332
T40 MOB/WPNS EFF TECH	15513	17448	17809	18024	18174	18578	18996
T41 MIL FACILITIES ENG TEC	5019	4178	4431	4297	4018	3979	3826
T42 COLD REGIONS ENGR TECH	4502	4530	4768	4830	4871	4979	5071
T45 ENERGY TEC APL MIL FAC	3329	3252	3208	3166	3132	3047	3041
T48 Center for Geosciences & Atmospheric Research		1988					
T52 Stationary Power and Energy Applied Research (CA)	3776						
T53 Military Engineering Applied Research (CA)	823	6043					

A. Mission Description and Budget Item Justification: The objective of this applied research program element (PE) is to provide military engineering technologies in support of the Future Force and, where feasible, exploit opportunities to enhance Current Force capabilities. 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 obscuration 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 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 Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, and the Army Research Laboratory located at Aberdeen, Maryland, execute the work.

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE		
2 - Applied Research	0602784A - MILITARY ENGINEERING TECHNOLOGY		
<u>B. Program Change Summary</u>	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008/2009)	51278	51120	52118
Current BES/President's Budget (FY 2009)	50817	58693	52066
Total Adjustments	-461	7573	-52
Congressional Program Reductions		-507	
Congressional Rescissions			
Congressional Increases		8080	
Reprogrammings	-104		
SBIR/STTR Transfer	-357		
Adjustments to Budget Years			-52
<p>Five FY08 congressional adds totaling \$8080 were added to this PE.</p> <p>(\$2000) Geosciences/Atmospheric Research (\$1200) C-RAM Armor Development (\$1280) Airborne Threats (\$1600) Nano-Crystalline Cement for High Strength, Rapid Curing Concrete with Improved Blast Resistance (\$2000) Biologically Inspired Security Infrastructure for Tactical Environments</p>			

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 2 - Applied Research		PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY					PROJECT 855	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
855 TOPOGRAPHICAL, IMAGE INTEL & SPACE	11154	14622	15122	15809	16562	17494	18433	

A. Mission Description and Budget Item Justification: The objective of this applied research project is to provide advanced technologies for storing, transforming, updating, 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 program elements (PE) 0601102A Project 52C and PE 0602784A Project H71. The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Data Generation: In FY07, developed and refined technologies to detect and geo-locate toxic battlefield compounds and agents. Began incorporating this capability into sensor technology that can be deployed in the battlespace environment. In FY08, experiment with prototype sensors, and develop methodologies to integrate the data collected into an expanded geo-database to include elements beyond those incorporated in previous years. In FY09, will design and develop new capabilities that exploit sensor data from various sources (including Soldiers, imagery, and lidar) to rapidly generate the minimum geospatial data required to support operations in various terrain (e.g., urban and complex terrain.)	1783	2406	2510
Data Management: In FY07, developed and tested a geospatial data model that incorporated traditional terrain data types and also included detailed tactical HUMINT data. In FY08, develop and refine 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. In FY09, will implement new geospatial terrain and cultural data technologies, taxonomies and models to ensure interoperability and sharing of information.	4455	5716	5970
Data Analysis: In FY07, matured urban terrain reasoning tools that incorporate the effects of natural, man-made features, and human activities into urban Course of Action planning tools. Developed a prototype geospatial game board for wargame and gaming applications. In FY08, develop a state of the art model for evidential reasoning that incorporates terrain and cultural conditions. In FY09, will complete experimentation and prototyping to include connection to Future Combat Systems Brigade Combat Team. Will evolve standalone evidential reasoning model(s) from standalone to reachback services.	4916	6352	6642
Small Business Innovative Research/Small Business Technology Transfer Programs		148	
Total	11154	14622	15122

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 2 - Applied Research		PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY					PROJECT H71	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
H71 ATMOSPHERIC INVESTIG	6701	6632	6728	6961	7016	7172	7332	

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 Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. Work in this project is performed by the Army Research Laboratory.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Develop a new high resolution, short-range forecasting capability: In FY07, designed and evaluated a Local Analysis and Prediction System (LAPS) capable of ingesting data from conventional and non-traditional data sources for nowcasting applications. In FY08, integrate a complete Weather Running Estimate-Nowcast (WRE-N) capability for DCGS-A that supports the fidelity and timeliness of the forecasts. Evaluate the use of Weather Research and Forecasting (WRF) model as part of the LAPS package within the WRE-N system for improved ability to ingest data from both conventional and non-traditional sources. In FY09, will formulate new methods to use microscale model output for critical micro- Unmanned Aircraft System (UAS) flight parameters that can improve the launch, operation, and recovery of UAS assets. Will research, design, and apply high resolution meteorological model improvements that account for fine scale structure in the urban boundary layer meteorology for an improved capability for predicting atmospheric effects.	2529	2556	2567
Determine critical value thresholds for weather impacts on friendly and threat systems for the rule-based Integrated Weather Effects Decision Aids: In FY07, integrated UAS route planning decision aids based on effects of wind, terrain, and weather hazards on platform and sensor performance. Designed UAS mission route flight optimization capability including enroute adjustments to account for atmospheric conditions. Adapted neural network acoustic propagation model into Sensor Performance Evaluator for Battlefield Environments (SPEBE) to achieve a faster solution. In FY08, employ automated Weather Intelligence-Routing (WIN-R) UAS flight optimization capability enabling automated route adjustments based on detected atmospheric effects. In FY09, will construct an acoustic model predicting the effects of single urban structures on detection and avoidance capabilities. Will explore machine-to-machine	2071	2089	2100

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT		
2 - Applied Research	0602784A - MILITARY ENGINEERING TECHNOLOGY	H71		
capability options for autonomous UAS flight control using WIN-R technology that will eliminate the need for the man-in-the-loop. Will integrate wideband enhancements to Tri-Service MODTRAN. Will integrate night-time illumination model improvements into Tri-Service Target Acquisition Weapons Software (TAWS).				
Develop models to improve condition prediction in urban/complex terrains that integrate high resolution boundary layer meteorological (met) measurements. In FY07, investigated the use of super-continuum LIDAR for remote spectral identification of airborne compounds. Explored the potential of using parameterized slope flow effects in a microscale wind model for greater fidelity and accuracy. Evaluated urban wind field models through field experiments for optimum met sensor placement. In FY08, prepare a microscale wind model for urban domains initialized with WRE-N and WRF model output with computationally efficient data assimilation methods. Investigate the capture efficiency of single particle aerosol extraction technologies and explore urban field measurement data against urban wind flow predictive models. In FY09, will employ stable boundary layer (a cool layer of air adjacent to a cold surface of the earth, where temperature within that layer is statically stably stratified) to improve existing high resolution boundary layer meteorological models. Will simulate and evaluate use of a microscale wind model as an integrated part of the DCGS-A weather system. Will develop and integrate a Doppler LIDAR Analysis Toolkit (DLAT) for semi-autonomous data assimilation and processing. Will investigate an integrated aerosol separation and bioassay instrument for detecting aerosols.	2101	1980	2061	
Small Business Innovative Research/Small Business Technology Transfer Programs			7	
Total	6701	6632	6728	

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 2 - Applied Research		PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY					PROJECT T40	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
T40 MOB/WPNS EFF TECH	15513	17448	17809	18024	18174	18578	18996	

A. Mission Description and Budget Item Justification: The objective of this applied research project is to develop technologies for rapid upgrading, construction, and repair of in-theater airfields; 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 Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the work.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Adaptive Protection - In FY07, developed algorithms for survivability design and assessment tools; produced low-cost, threat specific modular protective systems for large areas at about 1/5th the cost per square foot of advanced composite and ceramic armors; and initiated effort to develop technologies to provide protective materials and configurations against large caliber rockets and mortars, light artillery, and 50-caliber arms; and initiated effort to gain improved understanding of geophysical phenomenology to support detecting buried targets. In FY08, create novel layered protective materials to defeat 50-caliber arms and develop procedures for numerical evaluation of protective materials through multi-scale modeling. Develop Target Recognition (TR) for tunnel and tunneling activity detection for use by Joint Task Force North in their interdiction mission. In FY09, will design and assess protective systems and retrofits to defeat large caliber rockets, light artillery, and 50-caliber arms. Will develop sensor/geophysical algorithms for disturbed material signatures to be utilized by sensors that detect buried objects. Will commence development of tunnel sensor fusion algorithms and of real time analysis techniques for tunnel sensor performance assessment. Using the Computational Protection Testbed, will assess expedient protection against artillery and missiles.	6797	6427	7002
Austere Entry and Maneuver /Joint Rapid Airfield Construction In FY07, supported Joint Enable Theater Access-Sea Ports of Debarkation (JETA-SPOD) Joint Concept Technology Demonstration (JCTD) in conducting full-scale Lightweight Modular Causeway System (LMCS) component testing and demonstration. In FY08, provide technical support to develop designs that enable final fabrication and/or modifications as necessary for the system to be tested in a controlled field environment, including two full-scale LMCS sections and the JETA-SPOD Analysis Tool. Provide scientific expertise to monitor fabrication of the systems and provide Quality Assurance/Quality Control for the full-scale LMCS and provide design details and drawings for an Emplacement and Recovery System to be used on multiple launch platforms for the LMCS test series. In FY09, will provide technical expertise to support 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. Will also develop and assess design modifications for the LMCS that arise from this series of tests and provide these design modifications to the Transition Manager. Will develop the capability to rapidly identify and repair austere landing zones for vertical lift intra-theater	3755	6908	7880

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT		
2 - Applied Research	0602784A - MILITARY ENGINEERING TECHNOLOGY	T40		
access.				
Maneuver Support/Gap Defeat - In FY07, finalized and evaluated algorithms to predict performance of ARDEC_s Multi-Threat Objective Projectile (M-TOP) against urban targets. In FY08, participate in M-TOP redesign using the ERDC-developed, DOD-accredited penetration model, PENCVR3D. Participate in the M-TOP integrated demonstration by providing the instrumented structural target and weapons effects analysis. Future Force Breaching in MOUT: In FY09, will 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. Will, in cooperation with 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.	2664	2454	1713	
Geospatial Research and Engineering Support - In FY07, produced and refined products/procedures for interoperability; expanded scaling as required based on set of Battlespace Terrain Reasoning and Awareness (BTRA) information products; incorporated additional behaviors and related components as necessary to support training and course of action development and analysis. In FY08, create an Urban Tactical Decision Aid for planning the best mix of infantry and small unmanned ground vehicles for clearing a building. In FY09, will develop bridging analysis Tactical Decision Aid for determining necessary bridging assets to conduct gap crossing and defeat solutions and will support Geospatial Battle Management Language (GEOBML) syntax in support of the Battlespace Terrain Reasoning and Awareness Battle Command (BTRA-BC) efforts.	2297	1659	1214	
Total	15513	17448	17809	

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 2 - Applied Research		PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY					PROJECT T41	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
T41 MIL FACILITIES ENG TEC	5019	4178	4431	4297	4018	3979	3826	

A. Mission Description and Budget Item Justification: The objective of this applied research project is to deliver sustainable, cost efficient and effective facilities; and provide installation operations required to support the Future Force. The project focuses on advanced 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 U.S. 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 Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Facility Engineering: In FY07, completed protocols for determining boundary conditions (building exterior and interior) and boundary condition models for use by facility designers and operators to protect DoD facilities from air borne contaminants. In FY08, develop and evaluate prototype Carbon Nanotube (CNT)-based filaments, membranes, and coatings that have 2-fold to 10-fold improvement in performance (strength, weight) over existing materials (e.g. steels, polymers) for installation infrastructure materials. In FY09, will 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. Will develop molecular polarity maps for contaminant compounds using computational chemistry models.	1867	1537	2056
Facility Modeling and Simulation/Fort Future: In FY07, modeled buildings and cultural aspects of urban terrain in a computationally efficient form. In FY08, develop 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. Develop molecular models for sorption kinetics using dynamic, atom-by-atom buildup of contaminant on aged pipe-wall. Develop reaction kinetics in chlorinated/chloraminated water using computational chemistry models applied to the contaminant alone. In FY09, will develop analysis and predictive capabilities to enable units to gain cultural competence relevant to their mission. Will develop rate constants of uptake of contaminants on pipe wall based on results of the dynamic models using static representation of the contaminant alone.	3152	2641	2375
Total	5019	4178	4431

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY					PROJECT T42	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
T42 COLD REGIONS ENGR TECH	4502	4530	4768	4830	4871	4979	5071

A. Mission Description and Budget Item Justification: The objective of this applied research project is to 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 Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Terrain State: In FY07, formulated new model of energy and mass exchange for exterior urban surfaces to support target surveillance and reconnaissance; validated models of radiant temperatures of urban exterior surfaces. In FY08, establish and validate approaches such as real-time analysis techniques for sensor performance to greatly improve computational efficiency for carrying out terrain-state calculations. In FY09, will 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.	3296	2851	2757
Signature Physics: In FY07, formulated new approaches to multi-sensor fusion (e.g., acoustic and seismic) and optimization based on characteristics of a complex battlespace environment. In FY08, design and evaluate tactical decision aids supporting multi-mode sensor missions with templates of geo-environmental effects. Develop algorithms to identify disturbed soil signatures based on sensor modality and geo-environment. In FY09, will 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 into Battlespace Terrain Reasoning and Awareness - Battle Command (BTRA-BC) efforts.	1206	1667	2011
Small Business Innovative Research/Small Business Technology Transfer Programs		12	
Total	4502	4530	4768

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2008

BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY					PROJECT T45	
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
T45 ENERGY TEC APL MIL FAC	3329	3252	3208	3166	3132	3047	3041

A. Mission Description and Budget Item Justification: The objective of this applied research project is to provide technologies necessary for secure, energy efficient, sustainable military installations, emphasizing energy and utility systems protection from, and in response to, evolving needs such as contaminant detection. Advanced 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 Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.

Accomplishments/Planned Program:	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
Systems Response to Threats: In FY07, compared tool analyses to an instrumented Army facility using simulated chemical and biological agents. In FY08, develop predictive models and algorithms making use of activation energies for deformation and degradation mechanisms based on chemistry (moisture absorption, hygro-thermal effects and crack growth) for prediction of mechanical properties and durability of fiber reinforced polymer (FRP) composites for facilities and equipment. In FY09, will evaluate and test simulation algorithms based on failure modes and mechanistic models under interactive conditions. Will develop nanotechnology based detection and identification of targeted multiple contaminants in near-real-time for _detect-to-warn_ sensing in mission critical facilities.	1668	1787	3208
Installation Modeling and Simulation/Fort Future: In FY07, developed and assessed extended methodology to work with incomplete data sets. Network Enabled C2: In FY07, developed algorithms capable of inferring utility network layout from partial information. Developed algorithms to update the utility network layout as additional information is acquired. In FY08, develop analysis tools capable of identifying and summarizing a utility network's impact on military operations in urban terrain (MOUT).	1661	1443	
Small Business Innovative Research/Small Business Technology Transfer Programs		22	
Total	3329	3252	3208