

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2006

BUDGET ACTIVITY
2 - Applied Research

PE NUMBER AND TITLE
0602784A - MILITARY ENGINEERING TECHNOLOGY

	COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
	Total Program Element (PE) Cost	52477	50318	50098	50302	50811	51262	51663
855	TOPOGRAPHICAL, IMAGE INTEL & SPACE	10817	10936	12344	12403	12538	12647	12741
H71	ATMOSPHERIC INVESTIG	6501	6481	7016	6728	6865	6927	6980
T40	MOB/WPNS EFF TECH	17086	16136	17233	17687	17779	17942	18087
T41	MIL FACILITIES ENG TEC	4852	4834	5276	5238	5292	5335	5378
T42	COLD REGIONS ENGR TECH	4267	4358	4714	4716	4769	4812	4850
T45	ENERGY TEC APL MIL FAC	2822	3630	3515	3530	3568	3599	3627
T48	Center for Geosciences & Atmospheric Research	1727	1676	0	0	0	0	0
T49	UNIVERSITY PARTNERING FOR OPERATIONAL SUPPORT	2491	0	0	0	0	0	0
T52	Stationary Power and Energy Applied Research (CA)	957	1281	0	0	0	0	0
T53	Military Engineering Applied Research (CA)	957	986	0	0	0	0	0

A. Mission Description and Budget Item Justification: The objective of this applied research program element 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 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 battlespace environments 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 Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, and the Army Research Laboratory located at Aberdeen, Maryland, execute the project work.

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	FY 2005	FY 2006	FY 2007
<u>B. Program Change Summary</u>			
Previous President's Budget (FY 2006)	52500	47046	48188
Current BES/President's Budget (FY 2007)	52477	50318	50098
Total Adjustments	-23	3272	1910
Congressional Program Reductions		-220	
Congressional Rescissions		-508	
Congressional Increases		4000	
Reprogrammings	-23		
SBIR/STTR Transfer			
Adjustments to Budget Years			1910

Four FY06 Congressional adds totaling \$4000 were added to this PE.

FY06 Congressional adds with no R-2A (appropriated amount shown):

(\$500) Center for Geospatial Intelligence and Investigation

(\$1000) Detonation Suppression System Pilot Program

(\$1300) Fuel Cell Systems for the War Fighter

(\$1200) Geosciences Research

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BUDGET ACTIVITY 2 - Applied Research			PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY				PROJECT 855	
COST (In Thousands)		FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
855	TOPOGRAPHICAL, IMAGE INTEL & SPACE	10817	10936	12344	12403	12538	12647	12741
<u>A. Mission Description and Budget Item Justification:</u> 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 Project H71. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.								
<u>Accomplishments/Planned Program</u>						<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Data Generation - In FY05 matured methods to generate features from multispectral imagery, soils, and collect data from wireless devices in theater; matured prototype capabilities that convert geographic information within intelligence messages or other non-structured data into geospatial data for spatial analyses. In FY06, mature capabilities to geo-encode non-spatial sources to support planning and military decision-making process. In FY07, will mature tactical sensing capabilities to detect and geo-locate chemical and biological agents, and other critical battlespace environment features.						2256	1760	2874
Data Management - In FY05 matured and released tools that automated the fusion of elevation data from various sources and registered imagery from multiple sensors. In FY06, complete end-to-end testing of geospatial data management methods and tools and transition tools to Army systems/services. In FY07, will mature tools to correlate and integrate/fuse geospatial data from various sources (including tactical sensors and other sources) into a common geospatial database that supports multiple applications.						4680	4632	4487
Data Analysis - In FY05, matured and experimented with tactical bandwidth compatible terrain reasoning tools; developed information models and algorithms to solve multi-variable helicopter air maneuver route planning based on terrain, weather, and sensor effectiveness; matured initial spatial-temporal information constructs and terrain analysis capabilities for urban tactical battlespace environment planning. In FY06, mature prototype situation and threat analysis tools that will incorporate time-sensitive course of action (COA) information for Future Force applications addressing unit of action operations; will develop algorithms to solve maneuver route planning for helicopters and unmanned aerial vehicles; will enable rapid situational understanding and decision support in the urban battlespace environment. In FY07, will mature urban terrain reasoning tools that incorporate the effects of natural, man-made features, and human activities into urban COA planning tools.						3881	4544	4983
Total						10817	10936	12344

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BUDGET ACTIVITY 2 - Applied Research			PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY			PROJECT H71	
COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
H71 ATMOSPHERIC INVESTIG	6501	6481	7016	6728	6865	6927	6980
<p><u>A. Mission Description and Budget Item Justification:</u> The objective of this project is to perform the applied research for tactical weather and atmospheric effects algorithms, and for the integration of battlefield atmospheric environments simulations. The Army's transformation plan to the Future Force will require capabilities for battlefield commanders to make decisions based on tactical weather technology and impacts. This weather intelligence data will have to be not only 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 Project Director Integrated Meteorological System (PD-IMETS), and in the future to the Program Manager, Distributed Common Ground Station-Army (DCGS-A), 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 and Future Combat Systems (FCS) through future applications and platforms that support echelons at Brigade and below, down to the individual soldier, and Defense Technology Objectives, Weather/Atmospheric Impacts on Sensor Systems, and On-Scene Weather Sensing and Prediction Capability. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Army Research Laboratory.</p>							
<u>Accomplishments/Planned Program</u>				<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	
Mature a new high resolution, short-range forecasting capability based on integrating new battlefield meteorological data sources (non-conventional meteorological sensors such as Unmanned Aerial Vehicles (UAVs), robotic sensors, etc) into model initialization which will directly impact nowcast/very short-range forecast accuracy over the target area & provide much higher resolutions over the theater of operations. Implement a research version of an operational forecast/meteorological model that can ingest data from met satellites, UAV, and ground-based sensors. Research & verify the capability to host the model on battlefield processors, including battlefield fire support systems, to allow for autonomous generation of artillery meteorological message & production of near real time decision aids. In FY05, evaluated models with the most complete set(s) of modifications for insertion of meteorological data from non-traditional sources that were likely to exist on the future network-centric battlefield. Evaluated the modified research model for operation on processors that simulate those likely to be available to the network-centric future forces. In FY06, implement modifications based on field test results and complete a preliminary version of the research model that can ingest data from non-traditional sources. In FY07, will implement & evaluate a combined set of atmospheric models that can produce analyses & nowcasts at very fine scales for urban & complex terrain regions and are capable of assimilating non-traditional data.				2251	2365	2638	
Investigate critical value thresholds for weather impacts on friendly & threat systems for the rule-based Integrated Weather Effects Decision Aids & develop physics-based atmospheric effects models for operational combat mission planning, simulations & war games, and for sensor/weapon development. Mature the Acoustic Battlefield Aid (ABFA) and tri-service Target Area Weapons Software as key acoustic & Electro-Optic decision aids. Integrate distributed client applications on mobile devices for "first in" decision aids & for "over				1930	2072	2179	

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BUDGET ACTIVITY 2 - Applied Research	PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY		PROJECT H71
watch" of lower echelons. Devise access to weather on embedded soldier & system processors. Integrate vegetation & terrain effects and infrasonic frequencies into ABFA to support intelligence analysis. In FY05, created a 3D acoustic propagation model for handling dynamic atmospheric inputs & complex ground surfaces to produce high-fidelity simulated signals & realistic environmental impacts for acoustic sensors. Devised optical turbulence blur/feature distortion effects model to simulate performance differences & tradeoffs in sensor optics, detector spectral responses & signal processing methods. In FY06, integrate acoustic & seismic decision aid into a library of analysis modules tailored for user applications. Integrate a polarized radiative transport module in Weather & Atmospheric Visualization Effects for Simulation (WAVES). In FY07, will integrate route planning decision aids based on effects of winds, terrain, & weather hazards on platform performance.			
Integrate high resolution boundary layer meteorological measurements with models to improve quantifying combat conditions in urban/complex terrains. Enable the continuous assimilation of real time, 3D Light Detection And Ranging (LIDAR) remotely sensed wind data into micro-scale urban wind models for near real time, 3D picture of the current atmosphere over urban/complex terrain. Devise weather satellites' data applications to improve battlefield sensing. Apply new data compression standards to demonstrate 25:1 or greater compression of 2D, 3D and 4D meteorological databases to reduce bandwidth requirements. Quantify the value added of additional battlefield surface observations & vertical profiles to improve objective analysis, short-term forecasts and decision aids. Devise/verify algorithms for optimum meteorological sensor placement. Perform detailed measurements of the urban meteorological environment for model development/verification. In FY05, improved remote laser-based techniques for aerosol detection/classification using LIDAR technology. Investigated pattern classification techniques of background aerosols for class differentiation. Showed the fusion of LIDAR urban wind measurements with a 3D urban wind model. In FY06, show urban aerosol characterization using remote sensing for identification/verification with in situ collected data. Measure, characterize & analyze meteorological data over urban/complex terrain. Investigate automation techniques for sorting aerosol particles by optical signatures to identify threat agents. In FY07, will show a prototype automated MetSpaces information service with agents to collect/manage battlefield meteorological data & distribute model based products between echelons. Will investigate the use of super-continuum LIDAR for remote spectral identification of chem/bio threat agents.	2320	2044	2199
Total	6501	6481	7016

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BUDGET ACTIVITY 2 - Applied Research			PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY			PROJECT T40	
COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
T40 MOB/WPNS EFF TECH	17086	16136	17233	17687	17779	17942	18087
<p>A. Mission Description and Budget Item Justification: The objective of this applied research project is to provide technologies for rapid upgrading, construction, and repair of in-theater airfields; for overcoming battlespace gaps 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 Combat Systems (FCS) and 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 will mature technologies that will 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 Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.</p>							
Accomplishments/Planned Program				<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	
Force Protection - In FY05, increased the number of structural types that can be rapidly assessed from 13 to 20 structural types; produced protection upgrades for a variety of forward operating bases. In FY06, deliver algorithms for assessing the effectiveness of blast/fragment protection upgrades to structures in contingency environments that will increase the resistance of structures by 90% to 200% above current minimal protection. In FY07, will develop algorithms for survivability design and assessment tools, will produce 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.				5098	4961	5242	
Weapons Effects and Structural Response - In FY05, produced algorithms for predicting penetration of a 155mm projectile into urban materials ; defined mechanical properties of urban construction materials; estimated weapon and fragment penetration for range of urban target structures using existing weapons effects prediction methods; and conducted experiments and High Performance Computing calculations to define airblast propagation in the multi-building (9 buildings) urban environment.				1481	0	0	
Enable Theater Access /Joint Rapid Airfield Construction - In FY05, determined engineering properties of stabilized soils. In FY06, select rapid repair materials for paved airfield surfaces. In FY07, will select shear-resistant stabilizers and dust control additives for semi-prepared C-17 airfield surfaces. Rapid Port Enhancement - In FY05, integrated the Small Port Throughput Simulation Model into larger-scaled modeling systems and applications; conducted successful intermediate-scale experiments for the Lightweight Modular Causeway System (LMCS). In FY06, finalize design of LMCS and complete the Small Port Throughput Simulation Model and support Joint Enable Theater Access initiatives. In FY07, will conduct full-scale LMCS component testing and support demonstration.				4484	4568	4758	
Maneuver Support/Gap Defeat - In FY05, evaluated emerging sensor technologies for characterizing small terrain gaps, evaluated concepts for defeating gaps less than four meters wide through simulation and analyses; determined mobility performance attributes for advanced vehicle platforms such as small unmanned ground vehicles; created hydrologic decision analysis capability for wet gaps to provide rapid in-theater maneuver assessment for the warfighter. In FY06, integrate reconnaissance technologies for characterizing critical features of terrain gaps less than 4 meters wide and conduct evaluations of gap crossing technologies in simulated environments; create a force response element that represents the soil/snow for any motion system operating in real time simulated environments. Future Force Breaching - In FY05, conducted experiments that defined breaching effectiveness for hand-placed and standoff demolitions against structures; measured secondary debris and airblast produced by contact demolition charges; and produced the capability to predict damage				4137	4566	3204	

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2 - Applied Research	0602784A - MILITARY ENGINEERING TECHNOLOGY	T40	
to concrete walls. Hardened Combined Effects Penetrator Warheads - In FY07, will finalize analytical procedures for predicting projectile/target performance. UGV Autonomous Maneuver - In FY07, will begin to create capabilities to interpret local terrain characteristics from on-board sensors for autonomous maneuvers while keeping pace with manned counterparts.			
Battlespace Environment Support - In FY05, produced procedures to correlate and modify data structures between Battlespace Terrain Reasoning and Awareness (BTRA) and OneSAF Objective System (OOS) or other Modeling and Simulation (M&S) for point-to-point insertions. Extended BTRA routes to networks into OOS or other M&S using XML and ontological technologies. Developed a data model schema and structure with broader community applicability for simulation to C4ISR interoperability. Experimented with unique scaling and adaptive algorithms for entity and aggregate level maneuver networks; matured advanced throughput models for intelligent maneuver decisions including bypass options, route planning, resourcing, and management tools; determined combined effects of static and dynamic obstacles on maneuver planning tools; determined combined effects of static and dynamic obstacles on maneuver planning tools; provided functional components to create a common integrated obstacle overlay capability; and advanced tactical analyses of urban terrain and population as they pertain to the spectrum of military operations. In FY06, develop capability for transferring additional high-priority BTRA maneuver-related information products to OOS and other applications, will introduce extensions for computer-generated forces behaviors supporting training and course of action development and analysis. In FY07, will produce and refine products/procedures for interoperability; will expand scaling as required based on set of BTRA information products; will incorporate additional behaviors and related components as necessary to support training and course of action development and analysis.	1886	1683	1698
Remote Assessment/Rapid Analysis - In FY06, determine feasibility of interpreting sensor data to characterize critical infrastructure. In FY07, conduct road, bridge, and building experiments, and begin analysis.	0	358	2331
Total	17086	16136	17233

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BUDGET ACTIVITY 2 - Applied Research			PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY				PROJECT T41
COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
T41 MIL FACILITIES ENG TEC	4852	4834	5276	5238	5292	5335	5378
<p>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 CONUS facilities and forward bases, models predicting airborne dispersed chemical, biological, and radiological (CBR) 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 Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.</p>							
<u>Accomplishments/Planned Program</u>					<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
Facility Engineering - In FY05, completed initial beta version of model to depict CBR airborne dispersion rates in military facilities, and established performance related requirements for building envelopes, and completed forward facility planning tools. In FY06, establish performance related requirements for building envelopes for airborne CBR protection. In FY07, will complete 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 chemical and biological agents.					2513	1849	2098
Facility Modeling and Simulation/Fort Future - In FY05, validated prediction and optimization algorithms for installation capability to support Army Installation Transformation; and extended force projection algorithms to cover multiple, regional installations. Urban Reasoning and Battlespace Analysis - In FY06 define framework for incorporating facility use and cultural factors for tactical decision aids. In FY07, will model buildings and cultural aspects of urban terrain in computationally efficient form.					2339	2985	3178
Total					4852	4834	5276

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BUDGET ACTIVITY 2 - Applied Research			PE NUMBER AND TITLE 0602784A - MILITARY ENGINEERING TECHNOLOGY				PROJECT T42		
COST (In Thousands)			FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
T42	COLD REGIONS ENGR TECH		4267	4358	4714	4716	4769	4812	4850
A. Mission Description and Budget Item Justification: The objective of this applied research project is to provide warfighters with an accurate and timely understanding of the battlespace 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 Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.									
<u>Accomplishments/Planned Program</u>						<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	
Terrain State - In FY05, developed models and tactical decision aids for incorporating weather impacts on terrain into the Future Combat Systems commander's mobility analysis and course-of-action decision tools; established initial suite of remote site assessment, evaluation and selection decision aids for Joint Rapid Airfield Construction; matured and transitioned to the U.S. Army Tank Automotive Research, Development and Engineering Center vehicle simulator, high resolution 3-dimensional vehicle-terrain interaction algorithms for simulating terrain surfaces of snow, semi-frozen and thawing soils at the Ethan Allen Firing Range test track in Vermont. In FY06, complete formulation for all-season, all-terrain, 3-dimensional soil modeling for input to ground platform and terrain mechanics simulations; will complete model parameterization for vegetation and ground surface processes for tactical terrain analysis. In FY07, will formulate new model of energy and mass exchange for exterior urban surfaces to support target surveillance and reconnaissance; will validate models of radiant temperatures of urban exterior surfaces.						3407	3304	3455	
Signature Physics - In FY05, completed high-fidelity acoustic propagation simulation and dynamic acoustic vehicle signature model and mature algorithms to self adapt unattended ground sensors for local geologic effects in support of Networked Sensors for the Future Force (NSfFF); developed query and subscription based incorporation of signature physics tool set (e.g., weather induced terrain state) with the Command and Control in Complex and Urban Terrain program collaboration tools. In FY06, complete wide area infrared targeting template based on terrain-weather phenomena for wide range of targets and backgrounds. In FY07, will formulate new approaches to multi-sensor fusion (e.g., acoustic and seismic) and optimization based on characteristics of a complex battlespace environment.						860	1054	1259	
Total						4267	4358	4714	

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COST (In Thousands)			FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
T45	ENERGY TEC APL MIL FAC		2822	3630	3515	3530	3568	3599	3627
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 threats such as chemical, biological, and radiological (CBR) attacks. 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 Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). The U.S. Army Engineer Research and Development Center, headquartered at Vicksburg, Mississippi, executes the project work.									
<u>Accomplishments/Planned Program</u>						<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	
Energy and Utility Systems Response to Threats - In FY05, matured indoor performance analysis tools for building mechanical systems consistent with chemical and biological protection needs, and completed initial beta version of model to depict chemical and biological water borne dispersion rates in water systems. In FY06, validate CBR analysis tools in a controlled test facility. In FY07, will compare tool analyses to an instrumented Army facility using simulated chemical and biological agents.						1702	1400	1762	
Installation Modeling and Simulation/Fort Future - In FY05, matured integrated tools for judging suitability of energy infrastructure to support power projection, readiness, threat assessment, and sustainability requirements. In FY06, extend simulations for power, water, and fuel infrastructure analysis to forward staging areas. Urban Reasoning and Battlespace Analysis - In FY06, mature methodology to infer utility system topology. In FY07, will extend methodology to work with incomplete data sets. Future Forces Ranges - In FY07, will identify critical infrastructure signatures to support urban training simulations.						1120	2230	1753	
Total						2822	3630	3515	