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<b>ARMY RDT&amp;E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)</b>	DATE <b>February 1999</b>
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<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>	<b>PE NUMBER AND TITLE</b> <b>0603734A Military Engineering Advanced Technology</b>
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COST ( <i>In Thousands</i> )	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	18922	15523	15881	5240	4758	2939	5053	5396	0	Continuing
DT08 Combat Engineering Systems	9147	2255	3774	5240	4758	2939	5053	5396	0	Continuing
DT12 Rapid Terrain Visualization	9775	13268	12107	0	0	0	0	0	0	50844

**A. Mission Description and Justification:** This program encompasses demonstrations of technologies that provide the capabilities required for the engineer and logistician to successfully plan, rehearse and execute missions in support of the commander and the force projection Army. Critical deficiencies exist in the Army's ability to rapidly acquire, update, maintain and distribute terrain data in support of both terrain and battlefield visualization; to apply physics-based reasoning to planning and executing mobility, counter-mobility, survivability, and general engineering missions; to conduct logistics-over-the-shore operations in adverse sea states; to establish in-transit visibility of materiel and supplies; and to manage logistics distribution and logistics automation. The demonstration projects in this program element focus on the technologies required to correct these critical deficiencies. Capabilities demonstrated will be applicable to missions at all echelons within the force structure during either combat operations or operations other than war. Demonstrations are integral components of Army Advanced Warfighting Experiments, Advanced Concept Technology Demonstrations, other Advanced Technology Demonstrations, and joint field training exercises. Emphasis is placed on rapid transition of technologies into Command and Control (C2) systems, combat/war models and simulations or simulators. This provides shared situational awareness, common representation of terrain and consistent predictions or assessments of mobility, counter-mobility, survivability, and logistics missions in the linkage of C2 systems, models, and simulations being developed by the Army to exploit information technologies. The work in this program element is consistent with the Army Science and Technology Master Plan, the Training and Doctrine Command (TRADOC) Battlefield Visualization Concept, the Office of the Deputy Chief of Staff, Operations (ODCSOPS) Battlefield Visualization Objectives, the Army Modernization Plan, and Project Reliance.

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<b>B. Program Change Summary</b>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Previous President's Budget ( <u>FY 1999</u> PB)	19574	13564	15020	4906
Appropriated Value	20331	15564		
Adjustments to Appropriated Value				
a. Congressional General Reductions	-757	-41		
b. SBIR / STTR	-490			
c. Omnibus or Other Above Threshold Reductions				
d. Below Threshold Reprogramming				
e. Rescissions	-162			
Adjustments to Budget Years Since <u>FY 1999</u> PB			+861	+334
Current Budget Submit ( <u>FY 2000 / 2001</u> PB)	18922	15523	15881	5240

Change Summary Explanation: Funding - FY 1999 – Appropriated value reflects Congressional add (+2000).

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BUDGET ACTIVITY <b>3 - Advanced Technology Development</b>				PE NUMBER AND TITLE <b>0603734A Military Engineering Advanced Technology</b>				PROJECT <b>DT08</b>		
COST (In Thousands)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
DT08 Combat Engineering Systems	9147	2255	3774	5240	4758	2939	5053	5396	0	Continuing
<p><b>Mission Description and Justification:</b> This project will demonstrate, at full scale, a capability to conduct logistics-over-the-shore (LOTS) operations at sea-state 3; this will greatly increase LOTS throughput of equipment and supplies from ship to shore, and significantly reduce the time and materials required to establish linkages between LOTS sites and the inland transportation infrastructure. Present LOTS operations are limited to sea-state 2 or less; this is an unacceptable limitation to force projection. A complete engineering design of a full-scale Rapidly Installed Breakwater System (RIBS) will be developed based on detailed engineering analyses, and laboratory and ¼-scale field tests. A full-scale demonstration of RIBS that reduces waves conditions from the lower range of sea-state 4 by 50 percent will be performed. Evaluations of the full-scale deployability, transportability, mooring loads, structural integrity, and potential of RIBS for storm survival will be conducted. The capability to rapidly, and with minimum logistics burdens and reduced engineer equipment, stabilize beach sands and soft soils for roads, material storage areas, heliports, and other horizontal operating surfaces associated with LOTS operations will be demonstrated. The work is performed by the Waterways Experiment Station, Vicksburg, MS. Note: Sea-state is a measure of wave height and frequency of maximum wave energy.</p> <p><b>FY 1998 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 1558 - Demonstrated mobility and survivability battlefield operating system software during Ulchi Focus Lens in Korea to verify worldwide planning capabilities.</li> <li>• 5715 - Developed test plan, designed ocean-scale breakwater; and procured components and materials for 1Q99 field experiment; identified, evaluated, and selected geo-materials for sandy soil stabilization and surfacing. - Obtained laboratory data and designed field experiment to gather and analyze mooring system loads for RIBS.</li> <li>• 1874 - Tele-engineering: demonstrated baseline capabilities for providing from CONUS to OCONUS assessments of bridge military load class, transportation network capability and throughput, flooding and river levels, and force vulnerability to vehicle bombs; established tele-engineering presence on existing communications networks.</li> </ul> <p>Total 9147</p>										
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<p><b>FY 1999 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 269 - Deploy ocean-scale, 400-foot long RIBS; analyze field experiment data; initial design of prototype RIBS. - Determine mooring requirements for Rapidly Installed Breakwater System (RIBS).</li> <li>• 1927 - Exploration of selected geo-materials for soft soil (beach) stabilization and surfacing. - Develop plan for soft-soil stabilization field demonstration. - Development and test at 1/6 scale initial barge-RIBS design.</li> <li>• 59 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs..</li> </ul> <p>Total 2255</p> <p><b>FY 2000 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 3275 - Complete engineering design for full-scale rapidly installed breakwaters based on detailed engineering analyses, laboratory tests, and ocean scale field tests; provide the capability to rapidly stabilize beach sands with minimum logistics burdens and reduced engineer equipment .</li> <li>• 499 - Develop concept for a sandy beach field demonstration. - Field demonstration of soft-soil stabilization technology.</li> </ul> <p>Total 3774</p> <p><b>FY 2001 Planned Program:</b></p> <ul style="list-style-type: none"> <li>• 4097 - Deploy full-scale RIBS and mooring system at operational length (1000 ft).</li> <li>• 1143 - Provide plan, acquire materials for a sandy beach demonstration.</li> </ul> <p>Total 5240</p>		
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ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)								DATE February 1999		
BUDGET ACTIVITY 3 - Advanced Technology Development				PE NUMBER AND TITLE 0603734A Military Engineering Advanced Technology				PROJECT DT12		
COST (In Thousands)	FY1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY2004 Estimate	FY2005 Estimate	Cost to Complete	Total Cost
DT12 Rapid Terrain Visualization	9775	13268	12107	0	0	0	0	0	0	50844
<p><b>Mission Description and Justification:</b> This project will demonstrate the integration of critical battlefield visualization technologies in support of crisis response and force projection missions to enable the Joint Warfighter to successfully plan, rehearse and execute his mission. Digital Topographic Data (DTD) are the foundation for battlefield visualization and these data are not currently available for most areas where Force XXI units will operate. Methods for rapidly producing DTD to support military operations, particularly early entry, and the optimum resolution and format of digital terrain data for both current and notional systems need to be established. The Rapid Terrain Visualization (RTV) Advanced Concept Technology Demonstration (ACTD) will be conducted to demonstrate capabilities to rapidly collect source data and generate high resolution digital terrain databases to support crisis response and force projection operations within the timelines required by the joint force commander. The RTV ACTD will also demonstrate capabilities for the commander to integrate these terrain databases with current situation data, and manipulate and display the integrated databases to visualize the desired end state, and determine how to achieve his objectives. A capability for rapid collection of high-resolution (up to 1-meter grid spacing) digital terrain elevation data will be demonstrated, and imagery from aircraft and satellite platforms will be used to generate terrain feature data and map backgrounds. The RTV ACTD will provide and leave behind computer workstations and applications software to generate high resolution terrain databases to develop and evaluate courses of action using mission planning and embedded wargaming software, and to support mission rehearsals. This ACTD will also provide a tool for further exploration of emerging warfighting concepts and doctrine. The ACTD will leverage the Defense Advanced Research Projects Agency (DARPA) Battlefield Awareness and Data Dissemination (BADD) ACTD for data dissemination over the global broadcast system and tactical communications, and the Communications and Electronics Command (CECOM) Battlespace Command and Control (BC2) Advanced Technology Demonstration for workstations and applications software. This project is cooperatively executed with and will leverage work in progress by: the Topographic Engineering Center (TEC); National Imagery and Mapping Agency (NIMA); National Reconnaissance Office (NRO); Defense Airborne Reconnaissance Office (DARO) to include continuation of the Interferometric Synthetic Aperture Radar (IFSAR) work for FY00-01 in this PE as part of the Divestiture of DARO; and the Defense Modeling and Simulation Office (DMSO). This project is managed by the Joint Precision Strike Demonstration (JPSD) Program Office, Fort Belvoir, VA, Program Executive Officer, Intelligence, Electronic Warfare and Sensors (PEO-IEW&amp;S), Fort Monmouth, NJ. Contractors include: Raytheon, Bedford, MA; SAIC, Rosslyn, VA; MRJ, Oakton, VA; TASC, McLean, VA; EO-IR Measurements, Spotsylvania, VA; Steven Myers and Associates, Vienna, VA; and MTC, Shrewsbury, NJ. Participating government laboratories include: Topographic Engineering Center, Alexandria, VA; Army Research Laboratory, Adelphi, MD; Communications and Electronics Research, Development and Engineering Center, Ft. Monmouth, NJ.</p> <p><b>FY 1998 Accomplishments:</b></p> <ul style="list-style-type: none"> <li>• 4717 - Conducted detailed technical and operational study to select optimum radar and platform for collection of high-resolution digital elevation data.             <ul style="list-style-type: none"> <li>- Merged linear and spatial feature data into a fully integrated data set using prototype battlefield visualization database generation software and generated tailored databases for terrain analysis workstations.</li> </ul> </li> <li>• 5058 - Demonstrated baseline semi-automated feature extraction capability using commercial satellite imagery.</li> </ul>										
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<p><b>FY 1998 Accomplishments: (continued)</b></p> <ul style="list-style-type: none"> <li>- Demonstrated prototype Rapid Terrain Visualization (RTV) systems in JPSD Integration Evaluation Center (IEC) and obtained data to evaluate measures of effectiveness.</li> <li>- Participated in Division XXI AWE in support of III Corps and 101<sup>st</sup> Warfighting Experiment (WFX) in support of the XVIII Airborne Corps.</li> <li>- Installed version 1.0 of semi-automated topographic data generation software at XVIII Airborne Corps testbed and III Corps topographic units.</li> <li>- Received approval and acquired DeHavilland-7 platform.</li> </ul> <p>Total            9775</p> <p><b>FY1999 Planned Program:</b></p> <ul style="list-style-type: none"> <li>•            6155 - Acquire and process high-resolution digital elevation data set and commercial satellite imagery in direct support of XVIII Airborne Corps Warfighter Exercises (WFXs). - Exploit multi-spectral and radar imagery to accelerate the terrain feature extraction process using the prototype RTV database generation system.</li> <li>•            7113 - Iteratively upgrade workstations and software at XVIII Airborne Corps and III Corps. - Demonstrate RTV process in the IEC, including capabilities for rapid elevation data collection and semi-automated extraction of feature data. - Extend selected RTV capabilities from XVIII Airborne Corps to selected III Corps elements for further user evaluation. - Complete modifications to deHavilland-7 Aircraft, including installation and integration of RTV Interferometric Synthetic Aperture Radar (IFSAR) sensor and onboard processing capability. - Conduct evaluation of sensor and products and collect "ground truth" for IFSAR data verification.</li> </ul> <p>Total            13268</p> <p><b>FY 2000 Planned Program:</b></p> <ul style="list-style-type: none"> <li>•            6273 - Complete integration and testing of high-resolution elevation data collection capability on DASH-7 aircraft. - Demonstrate integrated end-to-end RTV process.</li> <li>•            3916 - Acquire and process digital terrain data using DASH-7 aircraft collection platform and commercial satellite sources in direct support of XVIII Airborne Corps WFXs. - Extend upgrades and capabilities to topographic units within III Corps.</li> <li>•            1918 - Complete upgrade of workstations and software to objective capability in the IEC and XVIII Airborne Corps and evaluate in WFX.</li> </ul> <p>Total            12107</p> <p><b>FY 2001 Planned Program:</b> Project not funded in FY 2001.</p>		
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