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Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Missile Defense Agency **DATE:** February 2011

APPROPRIATION/BUDGET ACTIVITY 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 ITEM NOMENCLATURE PE 0603883C: <i>Ballistic Missile Defense Boost Defense Segment</i>
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COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
Total Program Element	172.419	-	-	-	-	-	-	-	-	0.000	172.419
<i>WX19: Airborne Laser Capability Development</i>	167.608	-	-	-	-	-	-	-	-	0.000	167.608
<i>ZX40: Program-Wide Support</i>	4.811	-	-	-	-	-	-	-	-	0.000	4.811

Note

In FY 2011 the Boost Defense Program will transition from a weapon system development program to a science and technology program under Program Element 0603901C.

A. Mission Description and Budget Item Justification

Program Element 0603883C, Boost Defense Segment (BDS), funds the Airborne Laser Test Bed (ALTB) element portions of the Ballistic Missile Defense System (BMDS). The ALTB provides a capability to destroy ballistic missiles in the boost phase of their trajectory, the segment from post launch through propellant burnout. The boost phase typically includes the first 60-300 seconds of flight and concludes at altitudes between 20-450 kilometers. The ALTB program is designing, building, and testing airborne laser systems with unique capabilities to provide boost-phase defense against ballistic missile threats by acquiring, tracking, and destroying ballistic missiles and to support the multi-tiered BMDS concept. ALTB integrates three major subsystems (High Energy Laser [HEL]; Beam Control/Fire Control [BC/FC]; and Battle Management, Command, Control, Communications, Computers and Intelligence [BMC4I]) into a modified commercial 747 aircraft. ALTB also includes ALTB-specific ground support equipment.

In FY 2010, the primary mission of ALTB is to significantly increase the overall defensive capability of the BMDS by destroying threat ballistic missiles in their boost phase, by reducing the number of targets faced by successive defenders, and by addressing certain threats that are difficult for other elements to counter. ALTB is the primary boost-phase defense element being developed for the BMDS, uniquely adding the capability to destroy ballistic missiles from short to Intercontinental Ballistic Missile (ICBM) range during the boost phase. By destroying the missile during the boost phase, ALTB negates the threat prior to its ability to deploy multiple reentry vehicles, submunitions, or countermeasures. Following successful engagement by ALTB, warheads and engagement debris do not reach the intended target areas, with a reasonable probability that the threat missile debris will fall within the hostile country's own territory, reducing the possible effect of debris on protected areas and assets and perhaps serving as a deterrent. Secondary missions for an operational ALTB will be to provide additional threat protection through early ballistic missile launch warning, launch site estimation, cueing to BMDS, and impact point prediction. Detecting and tracking a missile during its boost phase significantly improves accurate estimation of the launch point and therefore enhances the probability of a successful counterstrike against an aggressor's missile launchers. ALTB's sensor capabilities further increase the robustness of the BMDS by enhancing the performance of other elements. In addition, ALTB's mobility and speed-of-light engagement capability present adversaries with additional complexities when trying to develop or employ countermeasures. As an airborne platform with aerial refueling capability, ALTB adds unique flexibility to deploy quickly to areas of interest and to adapt more readily to evolving situations that may threaten the US or its allies.

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The Airborne Laser Test Bed (ALTB) prototype has demonstrated the technology to destroy a boosting missile in flight. The initial lethal demonstration of a boosting ballistic missile occurred in February, 2010. After the initial shoot down demonstration, ALTB tested against missiles in flight at greater ranges and on the ground against countermeasures to fully characterize the ALTB.

B. Program Change Summary (\$ in Millions)	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012 Base</u>	<u>FY 2012 OCO</u>	<u>FY 2012 Total</u>
Previous President's Budget	182.317	-	-	-	-
Current President's Budget	172.419	-	-	-	-
Total Adjustments	-9.898	-	-	-	-
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-5.948	-			
• SBIR/STTR Transfer	-3.675	-			
• Other Adjustment Detail	-0.275	-	-	-	-

Change Summary Explanation

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APPROPRIATION/BUDGET ACTIVITY 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 ITEM NOMENCLATURE PE 0603883C: <i>Ballistic Missile Defense Boost Defense Segment</i>	PROJECT WX19: <i>Airborne Laser Capability Development</i>
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COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
<i>WX19: Airborne Laser Capability Development</i>	167.608	-	-	-	-	-	-	-	-	0.000	167.608
Quantity of RDT&E Articles	0	0	0		0	0	0	0	0		

Note

Beginning in FY 2011, the Boost Defense Segment Program Element, 0603883C, will be transferred to the Directed Energy Research Program Element, 0603901C. The Boost Defense Program will transition from a weapon system development program to a science and technology program beginning in FY 2011.

A. Mission Description and Budget Item Justification

The Airborne Laser Test Bed's (ALTB) revolutionary speed-of-light technology makes it a pathfinder for future directed energy weapon systems. The ALTB program is testing an airborne laser system with unique capabilities to defend against ballistic missile threats by acquiring, tracking, and destroying ballistic missiles. The high-powered laser has been fired over 100 times on the ground and was installed on the ALTB aircraft in FY 2008. The ALTB has demonstrated precision tracking and atmospheric beam compensation during flight over 2 dozen times in FY 2007 and 2009 -- including successful tracking against two boosting missiles in June 2009 and engagement against a low-power Missile Alternative Range Target Instrument (MARTI) boosting missile test asset in August 2009. The first high-powered lasing external to the aircraft in flight occurred in December 2009, with the first shoot down against a short-range liquid fueled foreign acquired target completed in February 2010. Engagement range for the ALTB is dependent upon track illumination, atmospheric compensation, laser power and missile type. After the initial shoot down demonstration, ALTB completed another successful flight experiment with a High Powered Missile Alternative Range Target Instrument (MARTI) at extended range. The ALTB tested against missiles in flight at greater ranges and on the ground against countermeasures to characterize the ALTB throughout the remainder of FY 2010.

Current Program Knowledge Points (KPs) are:

- Demonstrate High Energy Laser (HEL) performance Internal/External on the Aircraft in Flight (KP#9) - This KP demonstrated functionality of the optical system with the HEL on the aircraft in flight (completed Dec 09)
- Engagement against a High Power Missile Alternative Range Target Instrument (MARTI) (KP#10) - This KP validated and characterized High Power (using the High Energy Laser) ALTB performance against boosting targets (completed Jan 10)
- ALTB Technology Demonstrator lethal demonstration (KP #11) - This KP demonstrated ALTB capability to negate a threat representative boosting ballistic missile (completed Feb 10)

Following the ALTB Technology Demonstrator lethal demonstration, additional lethal demonstration events were conducted to further evaluate geometries and/or ranges of the current ALTB configuration.

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2010	FY 2011	FY 2012
<p>Title: Airborne Laser Test Bed</p> <p>Articles:</p> <p>Description: See Description Below</p> <p>FY 2010 Accomplishments: Planned Program (\$50.9 million)</p> <p>-Conducted additional lethal demonstration events through 4th Quarter of FY 2010, followed by system characterization, support, and development activities</p> <p>-Closed out technology demonstrator development contract (closeout of contractual requirements)</p> <p>FY 2011 Plans: N/A</p>		50.920 0	- 0	- 0
<p>Title: Industrial Base</p> <p>Articles:</p> <p>Description: See Description Below</p> <p>FY 2010 Accomplishments: -Continued development of advanced optics, coatings, and substrates to enable higher power/increased reliability laser operations -Maintained optics testing capabilities while testing new optics, materials, and coatings to maintain ready spares/aircraft availability -Continued improvements to bulkhead window production capability to enable higher power/longer and safer High Energy Laser (HEL) operations</p> <p>FY 2011 Plans: N/A</p>		3.890 0	- 0	- 0
<p>Title: Direct Support Activities</p> <p>Articles:</p> <p>Description: See Description Below</p> <p>FY 2010 Accomplishments:</p>		22.600 0	- 0	- 0

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)				FY 2010	FY 2011	FY 2012	
<p>Combined Test Force (\$13.1 million):</p> <ul style="list-style-type: none"> -Planned for and supported ALTB maintenance activities -Planned for and supported ground and flight test activities for the ALTB Characterization and Capability Demonstration phase: system characterization and adjunct missions -Created and presented safety documents to the test wing safety review boards <p>Lethality and Survivability (\$1.5 million)</p> <ul style="list-style-type: none"> -Continued intelligence, lethality data collection, assessments and evaluation <p>Diagnostics/Instrumentation (\$8.0 million)</p> <ul style="list-style-type: none"> -Ensured dedicated Airborne Diagnostic Target (ADT) was available for use during additional flight tests in FY 2010` <p>FY 2011 Plans: N/A</p>							
<p>Title: Characterization and Capability Demonstration</p> <p>Description: See Description Below</p> <p>FY 2010 Accomplishments: After the Airborne Laser Test Bed (ALTB) lethal demonstration (Flight Experiment Laser-01) and continuing through 4th quarter FY 2010, the ALTB program continued to demonstrate viability of the ALTB by conducting additional lethal demonstration efforts followed by further system characterization, support and development activities. The ALTB continued ground testing to gain knowledge of the capability of the system. ALTB performed product requirements analysis/derivation, design, development, testing and delivery of verified Modeling and Simulation tools in support of Ballistic Missile Defense System events. The program consolidated engineering and operations data and evaluated and characterized system capabilities.</p>				Articles:	90.198 0	- 0	- -

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
<p>-Completed engagement against a Low Power Missile Alternative Range Target Instrument (MARTI) - This validated and characterized Low Power (using the Surrogate High Energy laser) ALTB performance against boosting targets.</p> <p>-Demonstrated High Energy Laser (HEL) performance Internal/External on the Aircraft in Flight - This demonstrated functionality of the optical system with the HEL on the aircraft in flight.</p> <p>-Completed engagement against a High Power Missile Alternative Range Target Instrument (MARTI) - This validated and characterized High Power (using High Energy Laser) ALTB performance against boosting targets.</p> <p>-Completed ALTB Technology Demonstrator lethal demonstration - This demonstrated ALTB capability to negate a threat representative boosting ballistic missile (completed Feb 10)</p> <p>Conducted additional lethal demonstration events through 4th Quarter FY 2010 to further evaluate geometries and/or ranges of the current ALTB configuration (\$28.7 million)</p> <p>Maintained ALTB chemical operations and initiated post lethal demonstration ground test program to further characterize performance (\$6.0 million):</p> <p>-Completed High Energy Laser power tuning/optimization testing, for increases in High Energy Laser power to provide a longer range kill capability</p> <p>-Completed wavefront analysis to provide a longer range kill capability</p> <p>-Completed Beam Control/Fire Control adjustments to improve jitter and pointing accuracy</p> <p>Conducted sustainment activities to maintain the ALTB (\$55.5 million):</p> <p>-Sustained the ALTB (Laser, Beam Control/Fire Control, and Battle Management subsystems)</p>			

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
-Provided Quality Safety and Mission Assurance (QSMA) operations to ensure compliance with Agency requirements for design, test, manufacturing, quality, safety and reliability -Continued implementation of ALTB program security requirements -Published Adversary Data Package Addenda reflecting intelligence assessment updates -Produced and updated threat data to support demonstration of ALTB capability to destroy a boosting missile flight FY 2011 Plans: N/A			
Accomplishments/Planned Programs Subtotals	167.608	-	-

C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• 0603888C: <i>Ballistic Missile Defense Test and Targets</i>	737.863	1,113.425	1,071.039		1,071.039	898.680	790.906	787.113	878.215	Continuing	Continuing
• 0603901C: <i>DIRECTED ENERGY RESEARCH</i>	0.000	98.688	96.329		96.329	91.953	93.134	92.304	95.003	Continuing	Continuing

D. Acquisition Strategy

MDA's fiscal year FY 2010 budget submission reflected an emphasis on early intercept research and development. The acquisition strategy to conduct this technology development effort consists of three focus areas. First, leverage the technical expertise of Federally Funded Research and Development Centers and University Applied Research Centers. Second, continue to leverage relevant existing contracts within limits of Competition and Contracting Act (CICA) taking into account contractor past performance, scope, ceiling and period of performance. Third, for new technology initiatives, seek industry solutions via the Advanced Technology Broad Agency Announcement and competitive procurements.

Beginning in FY 2011, the Boost Defense Segment Program Element, 0603883C, will be transferred to the Directed Energy Research Program Element, 0603901C.

E. Performance Metrics

NA

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Product Development (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Airborne Laser Test Bed Prime Contract WX19	C/CPAF	The Boeing Company:Seattle, WA	687.967	-		-		-		-	0.000	687.967	687.967
Airborne Laser Test Bed BMDS Security WX19	C/CPAF	The Boeing Company:Seattle, WA	1.915	-		-		-		-	0.000	1.915	1.915
Airborne Laser Test Bed Technical Support Costs-1 WX19	C/CPAF	Northrop Grumman:Kirtland AFB/ Various	46.293	-		-		-		-	0.000	46.293	46.293
Airborne Laser Test Bed FFRDC Support WX19	MIPR	Aerospace:Kirtland AFB	2.460	-		-		-		-	0.000	2.460	2.460
Airborne Laser Test Bed Technical Support Costs-2 WX19	MIPR	Tecolote Research:Kirtland AFB	3.158	-		-		-		-	0.000	3.158	3.158
Airborne Laser Test Bed Logistics Costs WX19	C/CPAF	The Boeing Company:Seattle, WA, Tyndall AFB FL, KAFB NM	2.080	-		-		-		-	0.000	2.080	2.080
Airborne Laser Test Bed Government and Other Support Costs WX19	MIPR	AFRL:Kirtland AFB/MA, Multiple	2.908	-		-		-		-	0.000	2.908	2.908
Airborne Laser Test Bed Government and Other Costs-1 WX19	C/FP	ABL SPO:Kirtland AFB/ Multiple	5.179	-		-		-		-	0.000	5.179	5.179
Airborne Laser Test Bed Government and Other Costs-2 WX19	MIPR	ACC:VA	0.717	-		-		-		-	0.000	0.717	0.717
Airborne Laser Test Bed Government and Other Costs-3 WX19	MIPR	Brooks City Base:TX	0.625	-		-		-		-	0.000	0.625	0.625
Airborne Laser Test Bed Other Support Costs WX19	MIPR	Tyndall AFB:FL	0.260	-		-		-		-	0.000	0.260	0.260
Airborne Laser Test Bed CCMWG/Program Integration Support WX19	C/CPAF	The Boeing Company:Seattle, WA	3.734	-		-		-		-	0.000	3.734	3.734

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Product Development (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Airborne Laser Test Bed Active Ranging System WX19	MIPR	ESC Hanscom AFB:MA	3.000	-		-		-		-	0.000	3.000	3.000
Airborne Laser Test Bed Technical Support Costs-3 WX19	C/CPAF	KAFB/WPAFB:Multiple	0.476	-		-		-		-	0.000	0.476	0.476
Airborne Laser Test Bed Common Threat WX19	C/CPAF	Multiple:Multiple	1.862	-		-		-		-	0.000	1.862	1.862
Airborne Laser Test Bed BMDS Level Testing WX19	C/CPAF	The Boeing Company:Seattle, WA	10.000	-		-		-		-	0.000	10.000	10.000
Industrial Base Contract WX19	C/CPFF	Lockheed Martin/ Multiple:MD, CA	15.568	-		-		-		-	0.000	15.568	15.568
Characterization and Capability Demonstration Prime Contract WX19	C/CPAF	The Boeing Company:Seattle, WA	31.154	-		-		-		-	0.000	31.154	31.154
Characterization and Capability Demonstration BMDS Security WX19	C/CPAF	The Boeing Company:Seattle, WA	0.040	-		-		-		-	0.000	0.040	0.040
Characterization and Capability Demonstration Technical Support Costs-1 WX19	C/CPAF	Northrup Grumman:Kirtland AFB/ Various	4.151	-		-		-		-	0.000	4.151	4.151
Characterization and Capability Demonstration Government and Other Support Costs-1 WX19	MIPR	AFRL:Kirtland AFB/MA, Multiple	0.225	-		-		-		-	0.000	0.225	0.225
Characterization and Capability Demonstration Government and Other Support Costs-2 WX19	C/FP	ALTB SPO:Kirtland AFB, Multiple	1.701	-		-		-		-	0.000	1.701	1.701
Characterization and Capability Demonstration Government and Other Support Costs-3 WX19	MIPR	ACC, Brooks City Base:VA, TX	0.325	-		-		-		-	0.000	0.325	0.325
	MIPR	Aerospace:KAFB	1.200	-		-		-		-	0.000	1.200	1.200

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Product Development (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Characterization and Capability Demonstration FFRDC Support WX19														
Characterization and Capability Demonstration Technical Support Costs-2 WX19	MIPR	Tecolote Research:KAFB	0.670	-		-		-		-	0.000	0.670	0.670	
Characterization and Capability Demonstration Common Threat WX19	MIPR	Multiple:Multiple	0.677	-		-		-		-	0.000	0.677	0.677	
Characterization and Capability Demonstration BMDS Level Testing WX19	C/CPAF	The Boeing Company:Seattle, WA	50.055	-		-		-		-	0.000	50.055	50.055	
Subtotal			878.400	-		-		-		-	0.000	878.400	878.400	

Remarks
Common threat engineering produces common and consistent adversary trajectory and signature data to enable Ballistic Missile Defense (BMD) System and sub-system concept and requirements, design, verification, and assessment. Common Threat data is contained in the Adversary Capability Document (ACD) and Adversary Data Packages (ADP) and drives BMDS ground tests, flight tests, digital simulations, and pre-mission analysis activities. It is also used to develop the BMD System Description Document and BMD System Specification.

Support (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Subtotal			-	-		-		-		-	0.000	0.000	0.000	

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Test and Evaluation (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost			
Direct Support Activities BMDS Level Testing - Combined Test Force WX19	MIPR	AFFTC:Edwards AFB	54.495	-		-		-		-	0.000	54.495	54.495	
Direct Support Activities BMDS Level Testing - Lethality and Survivability WX19	MIPR	AFRL:Eglin AFB/NM, FL	26.334	-		-		-		-	0.000	26.334	26.334	
Direct Support Activities BMDS Level Testing - Diagnostics/Instrumentation WX19	MIPR	Hanscom AFB, Peterson AFB, Hill AFB, Kirtland AFB:MA, CO, UT, NM	55.247	-		-		-		-	0.000	55.247	55.247	
Subtotal			136.076	-		-		-		-	0.000	136.076	136.076	

Remarks

Management Services (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost			
Subtotal			-	-		-		-		-	0.000	0.000	0.000	
Project Cost Totals			1,014.476	-		-		-		-	0.000	1,014.476	1,014.476	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2012 Missile Defense Agency		DATE: February 2011
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Exhibit R-4A, RDT&E Schedule Details: PB 2012 Missile Defense Agency		DATE: February 2011
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Complete High Power System Integration Ground Testing	1	2010	1	2010
Demonstrate High Energy Laser Performance in Flight	1	2010	1	2010
Engagement of High Power Missile Alternative Range Target Instrument	1	2010	1	2010
Complete High Power System Integration Flight Testing	2	2010	2	2010
1st ALTB Lethal Demonstration - ALTB Intercept Flight Test (01)	2	2010	2	2010
Engagement of Second High Power Missile Alternative Range Target Instrument	3	2010	3	2010
ALTB Intercept Flight Test (02)	4	2010	4	2010

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Exhibit R-2A, RDT&E Project Justification: PB 2012 Missile Defense Agency **DATE:** February 2011

APPROPRIATION/BUDGET ACTIVITY 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 ITEM NOMENCLATURE PE 0603883C: <i>Ballistic Missile Defense Boost Defense Segment</i>	PROJECT ZX40: <i>Program-Wide Support</i>
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COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
ZX40: <i>Program-Wide Support</i>	4.811	-	-	-	-	-	-	-	-	0.000	4.811
Quantity of RDT&E Articles	0	0	0		0	0	0	0	0		

A. Mission Description and Budget Item Justification

Project ZX40 has been transferred project MD40.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2010	FY 2011	FY 2012
Title: Civilian Salaries and Support	4.811	-	-
Articles:	0		
Description: See Description Below			
FY 2010 Accomplishments: NA			
Accomplishments/Planned Programs Subtotals	4.811	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

D. Acquisition Strategy

NA

E. Performance Metrics

NA