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Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Army **Date:** February 2016

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV
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COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	-	16.389	11.797	4.597	-	4.597	10.389	10.087	13.789	0.096	Continuing	Continuing
RQ7: <i>RQ-7 Shadow UAV</i>	-	16.389	11.797	4.597	-	4.597	10.389	10.087	13.789	0.096	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Tactical Unmanned Aerial System (TUAS) RQ-7 provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the Combat Aviation Brigade's (CAB) Apache Reconnaissance Battalion. This will provide Aviation Brigades with Manned-Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged over 945,600 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The full Shadow system consists of four air vehicles with payload, two Universal Ground Control stations, two Universal Ground Data Terminals, one Portable Ground Control Station with Portable Ground Data Terminal, Ground Support Equipment, two launchers, ten High Mobility Multipurpose Wheeled Vehicles (HMMWVs) with trailer(s), and a Light Medium Tactical Vehicle. Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by a Mobile Maintenance Facility (MMF). The baseline fielded payload was the electro-optic infrared (EO/IR), but half of those were replaced with a Laser Designator (LD) payload. All 104 systems required by the Army Procurement Objective (APO) have been procured. In 2010 the Army G8 established an RQ-7B Unmanned Aerial Vehicle (UAV) MODs program. This budget line procures modifications including the Shadow v2, System Modifications, Mission Simulators, and One System Remote Video Terminal upgrades (OSRVT).

Implements Shadow v2: Tactical Common Data Link with Type 1 Encryption and North Atlantic Treaty Organization (NATO) interoperability; solves obsolescence associated with legacy computer hardware and the SOLARIS operating system. Government Furnished Equipment (GFE) and spares are also included.

Justification: Fiscal Year (FY) 2017 RQ-7 UAV Base funding of \$4.597 million will be used for capability and reliability improvements, specifically: Air Vehicle modifications development of the ability to operate in Global Positioning System (GPS) denied environment. Additionally, funds will be for system engineering and system test and evaluation support. Base funding will also be used to incorporate enhanced performance and interoperability into the OSRVT.

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B. Program Change Summary (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	16.389	7.297	7.928	-	7.928
Current President's Budget	16.389	11.797	4.597	-	4.597
Total Adjustments	0.000	4.500	-3.331	-	-3.331
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	4.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Other Adjustments 1	-	-	-3.331	-	-3.331

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Exhibit R-2A, RDT&E Project Justification: PB 2017 Army										Date: February 2016		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV				Project (Number/Name) RQ7 / RQ-7 Shadow UAV			
COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
RQ7: RQ-7 Shadow UAV	-	16.389	11.797	4.597	-	4.597	10.389	10.087	13.789	0.096	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Tactical Unmanned Aerial System (TUAS) RQ-7 provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the Combat Aviation Brigade's (CAB) Apache Reconnaissance Battalion. This will provide Aviation Brigades with Manned-Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged over 975,000 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The full Shadow system consists of four air vehicles with payload, two Universal Ground Control stations, two Universal Ground Data Terminals, one Portable Ground Control Station with Portable Ground Data Terminal, Ground Support Equipment, two launchers, ten High Mobility Multipurpose Wheeled Vehicles (HMMWVs) with trailer(s), and a Light Medium Tactical Vehicle. Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by a Mobile Maintenance Facility (MMF). The baseline fielded payload was the electro-optic infrared (EO/IR), but half of those were replaced with a Laser Designator (LD) payload. All 104 systems required by the Army Procurement Objective (APO) have been procured. In 2010 the Army G8 established an RQ-7B Unmanned Aerial Vehicle (UAV) MODs program. This budget line procures modifications including the Shadow v2, System Modifications, Mission Simulators, and One System Remote Video Terminal (OSRVT) upgrades.

Implements Shadow RQ-7BV2: Tactical Common Data Link with Type 1 Encryption and North Atlantic Treaty Organization (NATO) interoperability; solves obsolescence associated with legacy computer hardware and the SOLARIS operating system. Government Furnished Equipment (GFE) and initial spares are also included.

Justification: Fiscal Year (FY) 2017 RQ-7 UAV Base funding of \$4.597 million will be used for capability and reliability improvements. Air Vehicle Improvements include the ability to operate in Global Positioning System (GPS) denied environments. Additionally, funds will be for system engineering and system test and evaluation support. Base funding will also be used to incorporate enhanced performance and interoperability into the OSRVT.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Air Vehicle Improvements	6.297	2.173	2.087	-	2.087
Description: Air Vehicle Improvements					
FY 2015 Accomplishments: Development of Manned Unmanned Teaming (MUM-T), software blocking, and Block III Engine development.					
FY 2016 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2017 Army			Date: February 2016		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV	Project (Number/Name) RQ7 / RQ-7 Shadow UAV			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Continued development of MUM-T and software blocking. FY 2017 Base Plans: Continued development of the ability to operate in GPS denied environment.					
Title: Payload Improvements Description: Payload Improvements FY 2016 Plans: Continued development of TUAS EO/IR payloads.	-	2.000	-	-	-
Title: Ground Equipment Improvements Description: Ground Equipment Improvements FY 2015 Accomplishments: Funded Ground Equipment Improvements. Development of interoperability capabilities through use of Universal Ground Data Terminals and Universal Ground Control Stations, Network Security and System Vulnerability FY 2016 Plans: Continues to fund Ground Equipment Improvements. Continues development of interoperability capabilities through use of Universal Ground Data Terminals and Universal Ground Control Stations, Network Security and System Vulnerability.	3.682	3.491	-	-	-
Title: Test and Evaluation Description: Test and Evaluation FY 2015 Accomplishments: Test and evaluation of Air Vehicle and Ground Equipment Improvements. FY 2016 Plans: Continues to fund test and evaluation of Air Vehicle and Ground Equipment Improvements. FY 2017 Base Plans: Continues to fund test and evaluation of Air Vehicle and Ground Equipment Improvements.	1.711	0.927	0.513	-	0.513
Title: System Engineering/Program Management Description: System Engineering/Program Management	2.566	1.248	0.678	-	0.678

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Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV	Project (Number/Name) RQ7 / RQ-7 Shadow UAV
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p><i>FY 2015 Accomplishments:</i> Funded System Engineering/Program Management.</p> <p><i>FY 2016 Plans:</i> Continues to fund System Engineering/Program Management.</p> <p><i>FY 2017 Base Plans:</i> Continues to fund System Engineering/Program Management.</p>					
<p><i>Title:</i> One System Remote Video Terminal (OSRVT)</p> <p><i>Description:</i> OSRVT</p> <p><i>FY 2016 Plans:</i> Funds the performance and interoperability improvements to the OSRVT.</p> <p><i>FY 2017 Base Plans:</i> Continues to fund performance and interoperability improvements to the OSRVT.</p>	-	1.958	1.319	-	1.319
<p><i>Title:</i> One System Remote Video Terminal Test and Evaluation</p> <p><i>Description:</i> One System Remote Video Terminal Test and Evaluation</p> <p><i>FY 2015 Accomplishments:</i> Completed developmental testing of Increment II capabilities and conduct Initial Operational Test and Evaluation (IOT&E)</p>	2.133	-	-	-	-
Accomplishments/Planned Programs Subtotals	16.389	11.797	4.597	-	4.597

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017 Base</u>	<u>FY 2017 OCO</u>	<u>FY 2017 Total</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RQ-7 UAV MODS: A00018	125.380	89.694	79.809	1.775	81.584	89.850	75.009	5.446	-	Continuing	Continuing
Remarks											

D. Acquisition Strategy
A System Capability Demonstration (SCD) was conducted with four contractors. The results from the SCD in conjunction with proposal evaluations resulted in the competitive down select of a Best Value TUAS. A successful Milestone II Army Systems Acquisition Review Council (ASARC) was conducted 21 Dec 1999 and

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Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 7	PE 0305233A / RQ-7 UAV	RQ7 / RQ-7 Shadow UAV

a Milestone III Decision was reached on 25 Sep 2002. The full rate production contract was awarded 27 Dec 2002 and in FY2009 the last of the authorized 104 systems was placed on contract. Continued development of the selected Tactical Unmanned Aerial Vehicle (TUAV) system will be accomplished through a series of modifications and retrofits such as Shadow v2, Communications Relay, Laser Designator, Block III engine, and reliability upgrades. Development/integration of these improved capabilities will be through individual efforts on an engineering services contract with Shadow contractors. Development of the Block III engine is being accomplished through a competitive process.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Army												Date: February 2016			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0305233A / RQ-7 UAV				RQ7 / RQ-7 Shadow UAV							
Management Services (\$ in Millions)				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Base: Program Management	RO	PM UAS : Redstone Arsenal, AL	2.718	0.570		0.167		0.137		-		0.137	Continuing	Continuing	Continuing
Subtotal			2.718	0.570		0.167		0.137		-		0.137	-	-	-
Product Development (\$ in Millions)				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
OIF Improvements / Block Upgrades / Capability Improvements	SS/CPFF	AAI Corporation : Hunt Valley, MD	3.105	-		-		-		-		-	0	3.105	0
System Engineering / Reliability Solutions	SS/CPFF	AAI Corporation : Hunt Valley, MD	2.025	-		-		-		-		-	0	2.025	0
Ground Equipment Improvements	SS/CPFF	AAI Corporation, MD : AAI Corporation, MD	13.218	3.682	Jan 2015	3.491	Oct 2015	-		-		-	Continuing	Continuing	Continuing
Block III Engine Development	C/CPFF	LSF : Redstone Arsenal, AL	24.824	5.901	May 2015	-		-		-		-	0	30.725	0
Other Air Vehicle Improvements	SS/CPFF	AAI Corporation, MD : AAI Corporation, MD	15.981	0.396	May 2015	0.673	Oct 2015	-		-		-	Continuing	Continuing	Continuing
GPS Denied Development	SS/CPFF	AAI Corporation : Hunt Valley, MD	0.000	-		1.500	Oct 2015	2.087	May 2017	-		2.087	Continuing	Continuing	0
Payload Improvements	SS/CPFF	Various : Various	2.750	-		2.000	Feb 2016	-		-		-	0	4.750	0
One System Remote Video Terminal (OSRVT)	SS/CPFF	AAI Corporation, MD : AAI Corporation, MD	11.129	-		1.958	May 2016	1.319	Apr 2017	-		1.319	Continuing	Continuing	Continuing
Subtotal			73.032	9.979		9.622		3.406		-		3.406	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Army **Date:** February 2016

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV	Project (Number/Name) RQ7 / RQ-7 Shadow UAV
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Support (\$ in Millions)				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contractor Engineering Support	Various	Various : Various	0.562	1.331	Dec 2014	0.722	Oct 2015	0.362	Dec 2016	-		0.362	Continuing	Continuing	Continuing
Base: Government Engineering and Logistic Support	MIPR	Various : Various	0.281	0.665	Nov 2014	0.359	Feb 2016	0.179	Nov 2016	-		0.179	Continuing	Continuing	Continuing
Subtotal			0.843	1.996		1.081		0.541		-		0.541	-	-	-

Test and Evaluation (\$ in Millions)				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RQ-7 Developmental Testing of Product Development	Various	Various : Various	3.237	1.611	Aug 2015	0.827	Oct 2015	0.413	Dec 2016	-		0.413	Continuing	Continuing	Continuing
RQ-7 Operational Testing of Product Developments	MIPR	Various : Various	0.200	0.100	Aug 2015	0.100	Oct 2015	0.100	Dec 2016	-		0.100	Continuing	Continuing	Continuing
OSRVT Developmental Testing	MIPR	Various : Various	0.000	0.100	May 2015	-		-		-		-	0	0.100	0
OSRVT - Operational Testing	MIPR	Various : Various	0.000	2.033	May 2015	-		-		-		-	0	2.033	0
Subtotal			3.437	3.844		0.927		0.513		-		0.513	-	-	-

	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	80.030	16.389	11.797	4.597	-	4.597	-	-	-

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2017 Army **Date:** February 2016

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV	Project (Number/Name) RQ7 / RQ-7 Shadow UAV
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Event Name	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Block III Engine Development	Block III ED																											
GPS Denied Development									GPS Denied																			
Interoperability Upgrades									IU																			
Software Block Upgrades									SBU																			
Reliability Improvements																	RI											
OSRVT Increment II Interoperability Improvements									OSRVT																			
(1) OSRVT IOT&E	OSRVT IOT&E ▲																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2017 Army **Date:** February 2016

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV	Project (Number/Name) RQ7 / RQ-7 Shadow UAV
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Block III Engine Development	1	2015	3	2016
GPS Denied Development	1	2017	4	2018
Interoperability Upgrades	1	2015	4	2020
Software Block Upgrades	1	2015	4	2020
Reliability Improvements	1	2019	4	2021
OSRVT Increment II Interoperability Improvements	1	2013	4	2021
OSRVT IOT&E	3	2015	3	2015