Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army												Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0605035A *I Common Infrared Countermeasures (CIRCM)*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	90.685	127.318	51.178	2.670	53.848	46.445	27.385	1.453	1.481	0.000	348.615
EB4: *CIRCM*	-	90.685	127.318	51.178	2.670	53.848	46.445	27.385	1.453	1.481	0.000	348.615

A. Mission Description and Budget Item Justification

The Common Infrared Countermeasure (CIRCM) budget line includes CIRCM (EB4), and funding to counter emerging technology as identified in Joint Urgent Operational Needs Statement (JUONS) SO-0010 Phase 2a and the Headquarters Department of the Army (HQDA) Directed Requirement for the Advanced Threat Warner Common Infrared Countermeasures Quick Reaction Capability (ATW & CIRCM QRC).

CIRCM (EB4)
The Common Infrared Countermeasure (CIRCM) is the next generation lightweight, laser-based Infrared Countermeasure (IRCM) component that will interface with both the Army's Common Missile Warning System (CMWS) and future missile warning systems (MWS) to defeat current and emerging missile threats that use multispectral technology for rotary-wing, tilt-rotor and small fixed-wing aircraft across the DoD. CIRCM receives an angular bearing hand-off from the MWS, employs a pointing and tracking system which acquires the handed-over threat and tracks the incoming missile during and after motor burnout. CIRCM jams the missile by using modulated laser energy in the missile seeker band, thus degrading the tracking capability of the missile and causing it to miss the aircraft. CIRCM is utilizing Open Systems Architecture which allows flexibility with software and hardware refreshes to keep pace with future threats.

The CIRCM A-Kit includes mounting hardware, wiring harnesses, and other components necessary to install and interface the mission kit on host aircraft. The A-Kit ensures the mission kit is functionally and physically operational with a specific host aircraft type. The CIRCM B-Kit is the mission kit (laser, pointer tracker, and controller) required to achieve near spherical coverage for an aircraft.

JUONS SO-0010 and ATW & CIRCM QRC
Phase 2a DoN LAIRCM (JUONS S0-0010) and Phase 3 ATW & CIRCM QRC: Initially, a select number of aircraft in the threat area of responsibility will be outfitted with the Phase 2a Department of the Navy Large Aircraft Infrared Countermeasure (DoN LAIRCM) system. However, this approach came with a Space, Weight and Power - Cooling (SWaP-C) penalty which is being addressed as a follow-on JUONS solution requirement using the Phase 3 Advanced Threat Warner (ATW) and Common Infrared Countermeasure (CIRCM) Quick Reaction Capability (QRC). The intent of the Phase 3 ATW & CIRCM QRC effort is to reduce the SWaP-C associated with the Phase 2a solution.

FY 2019 Base Research, Development, Test, and Evaluation (RDT&E) funding in the amount of $51.178 million funds continued A-Kit and B-Kit development, and post Milestone C planning and execution of Initial Operational Test and Evaluation (IOT&E).

FY 2019 RDT&E Overseas Contingency Operations (OCO) funding in the amount of $2.670 million will support regression testing efforts related to the Phase 3 ATW & CIRCM QRC effort.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army					Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 5: *System Development & Demonstration (SDD)*			R-1 Program Element (Number/Name) PE 0605035A / *Common Infrared Countermeasures (CIRCM)*		
B. Program Change Summary ($ in Millions)	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**
Previous President's Budget	107.877	127.318	52.410	-	52.410
Current President's Budget	90.685	127.318	51.178	2.670	53.848
Total Adjustments	-17.192	0.000	-1.232	2.670	1.438
• Congressional General Reductions	-14.000	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.152	-			
• Adjustments to Budget Years	-	-	-1.232	2.670	1.438
• FFRDC	-0.040	-	-	-	-

Change Summary Explanation

FY 2019 funding will support efforts related to the Phase 3 ATW & CIRCM QRC effort.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	Project (Number/Name) EB4 / *CIRCM*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EB4: *CIRCM*	-	90.685	127.318	51.178	2.670	53.848	46.445	27.385	1.453	1.481	0.000	348.615
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funds in the program are a realignment of funds from program VU8, PE 0604270A (Electronic Warfare Development) for more efficient and effective program management.

A. Mission Description and Budget Item Justification

The Common Infrared Countermeasure (CIRCM) budget line includes CIRCM (EB4), and funding to counter emerging technology as identified in Joint Urgent Operational Needs Statement (JUONS) SO-0010 Phase 2a and the Headquarters Department of the Army (HQDA) Directed Requirement for the Advanced Threat Warner Common Infrared Countermeasures Quick Reaction Capability (ATW & CIRCM QRC).

CIRCM (EB4)
The Common Infrared Countermeasure (CIRCM) is the next generation lightweight, laser-based Infrared Countermeasure (IRCM) component that will interface with both the Army's Common Missile Warning System (CMWS) and future missile warning systems (MWS) to defeat current and emerging missile threats that use multispectral technology for rotary-wing, tilt-rotor and small fixed-wing aircraft across the DoD. CIRCM receives an angular bearing hand-off from the MWS, employs a pointing and tracking system which acquires the handed-over threat and tracks the incoming missile during and after motor burnout. CIRCM jams the missile by using modulated laser energy in the missile seeker band, thus degrading the tracking capability of the missile and causing it to miss the aircraft. CIRCM is utilizing Open Systems Architecture which allows flexibility with software and hardware refreshes to keep pace with future threats.

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JUONS SO-0010 and ATW & CIRCM QRC
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FY 2019 Base Research, Development, Test, and Evaluation (RDT&E) funding in the amount of $51.178 million funds continued A-Kit and B-Kit development, and post Milestone C planning and execution of IOT&E.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	**Project (Number/Name)** EB4 / *CIRCM*

FY 2019 RDT&E Overseas Contingency Operations (OCO) funding in the amount of $2.670 million will support regression testing efforts related to the Phase 3 ATW & CIRCM QRC effort.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: CIRCM Product Development ***Description:*** CIRCM Product Development, Support Costs, & Management Services ***FY 2018 Plans:*** RDT&E dollars support completion of EMD phase and start of the Production and Deployment phase, start of Low Rate Initial Production (LRIP) 1, and multi-platform A-Kit and B-Kit development and integration. ***FY 2019 Base Plans:*** RDT&E dollars support continued software and hardware development of A-Kits and B-Kits for the AH-64E, CH-47F, and MH-60M platforms. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 funding is decreased compared to FY 2018 funding because CIRCM will have achieved Milestone C, and will therefore require less RDT&E funding than in FY 2018.	27.479	54.687	25.068	-	25.068
Title: CIRCM Test & Evaluation (T&E) ***Description:*** CIRCM Test & Evaluation (T&E) Activities ***FY 2018 Plans:*** RDT&E dollars support completion of Reliability Demonstration Testing (RDT), and continue A-Kit and B-Kit testing to include developmental/operational T&E. ***FY 2019 Base Plans:*** RDT&E dollars support post Milestone C planning and execution of IOT&E, and continued efforts to develop IRCM solutions to defeat newly developed threats. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 funding is decreased compared to FY 2018 funding because CIRCM will have achieved Milestone C, and will therefore require less RDT&E funding than in FY 2018.	52.306	51.091	26.110	-	26.110
Title: Phase 3 ATW & CIRCM QRC OCO ***Description:*** Phase 3 ATW & CIRCM QRC Integration and Testing	10.900	21.540	0.000	2.670	2.670

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	**Project (Number/Name)** EB4 / *CIRCM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
FY 2018 Plans: RDT&E dollars will support the Army ATW Processor, B-Kit development, integration, and associated T&E efforts. This effort will integrate the ATW and CIRCM systems to reduce Space, Weight and Power - Cooling (SWaP-C) in support of Phase 3. ***FY 2019 Base Plans:*** N/A ***FY 2019 OCO Plans:*** FY 2019 RDT&E Overseas Contingency Operations (OCO) funding in the amount of $2.670 million will support regression testing efforts related to the Phase 3 ATW & CIRCM QRC effort. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 funding is decreased compared to FY 2018 funding because the majority of the required CIRCM related integration and testing for Phase 3 ATW & CIRCM QRC will have been completed by the end of FY 2018. FY19 funding will support regression testing for safety of flight.					
Accomplishments/Planned Programs Subtotals	90.685	127.318	51.178	2.670	53.848

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• AZ3537: *SSN AZ3537; BA4; CIRCM*	108.721	49.777	36.987	115.830	152.817	113.371	119.609	149.287	168.418	Continuing	Continuing

Remarks

None

D. Acquisition Strategy

The December 28, 2011, Defense Acquisition Executive (DAE) Acquisition Decision Memorandum (ADM) authorized entry into the Technology Maturation and Risk Reduction (TMRR) phase, designated the program a pre-Major Defense Acquisition Program (MDAP), and approved the updated exit criteria. The August 25, 2015, DAE ADM authorized entry into the Engineering and Manufacturing Development (EMD) phase and designated the program as a MDAP. The EMD contract was awarded to Northrup Grumman Systems Corporation (NGSC) on August 28, 2015. The EMD contract includes priced options for Other Platform A-Kit Development, A-Kit Engineering Support, Low Rate Initial Production (LRIP) 1 and 2 Prototypes (Hardware and Installs), LRIP 1 and 2 Engineering and Test Support, Software Technical Data Package (TDP), Navy funded requirements, and Defense Exportability Features (DEF). Upon CIRCM MS C approval planned for the fourth quarter of FY18, the

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	**Project (Number/Name)** EB4 / *CIRCM*

LRIP and Engineering Support options may be exercised and the program may immediately enter the Production & Deployment phase with First Unit Equipped (FUE) planned for third quarter of FY20, and a Full Rate Production Decision Review (FRPDR) planned for the third quarter of FY20.

Due to the urgency of addressing the SWaP-C penalty issues related to the JUONS SO-0010 initial DoN LAIRCM material solution, the Army approved a Directed Requirement for the ATW and CIRCM systems, which will be a sole source QRC effort with Northrop Grumman. Northrop Grumman has the required technical capabilities, knowledge and special equipment needed to meet the urgent and compelling need for the ATW CIRCM QRC effort.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	Project (Number/Name) EB4 / *CIRCM*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering Program Management	Various	Various : -	14.504	8.017		9.978		5.879	Oct 2018	0.267	Dec 2018	6.146	Continuing	Continuing	Continuing
ATW CIRCM QRC System Engineering & Program Management	Various	Various : -	-	1.100		2.154		-		-		-	Continuing	Continuing	Continuing
		Subtotal	14.504	9.117		12.132		5.879		0.267		6.146	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Non-recurring Engineering (NRE)	C/CPFF	Various : -	45.906	11.007	Nov 2016	18.125		11.330	Jun 2019	-		11.330	Continuing	Continuing	Continuing
Prototype Manufacturing	C/FPIF	Various : -	25.334	-		11.892		-		-		-	Continuing	Continuing	Continuing
Development - System Integration Lab (SIL) Capability Improvements	Various	Various : -	-	-		2.000		-		-		-	Continuing	Continuing	Continuing
Other - Threat Management	Various	Various : -	15.659	8.017	Mar 2017	6.692		5.409	Mar 2019	-		5.409	Continuing	Continuing	Continuing
Data - Logistics Support	Various	Various : -	0.267	0.438	May 2017	1.000		-		-		-	Continuing	Continuing	Continuing
ATW CIRCM QRC NRE	C/CPFF	Various : -	-	3.280	Nov 2016	3.231		0.000		0.400	Dec 2018	0.400	Continuing	Continuing	Continuing
ATW CIRCM QRC Prototype Manufacturing	C/CPFF	Various : -	-	2.120	Nov 2016	-		-		-		-	Continuing	Continuing	Continuing
ATW CIRCM QRC A-Kit Development & Integration	Various	Various : -	22.390	-		5.385		0.000		0.668	Mar 2019	0.668	Continuing	Continuing	Continuing
		Subtotal	109.556	24.862		48.325		16.739		1.068		17.807	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	Project (Number/Name) EB4 / *CIRCM*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Equipment	Various	Various : -	5.046	-		5.000		3.000	Feb 2019	-		3.000	Continuing	Continuing	Continuing
		Subtotal	5.046	-		5.000		3.000		-		3.000	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government System Test and Evaluation	Various	Various : -	52.893	37.514	Apr 2017	42.417		13.379	Apr 2019	-		13.379	Continuing	Continuing	Continuing
Other Testing - Threat Assets	Various	Various : -	16.200	14.792	May 2017	8.674		12.181	May 2019	-		12.181	Continuing	Continuing	Continuing
ATW CIRCM QRC Government System Test & Evaluation	Various	Various : -	1.610	4.400	Mar 2017	10.770		0.000		1.335	Mar 2019	1.335	Continuing	Continuing	Continuing
		Subtotal	70.703	56.706		61.861		25.560		1.335		26.895	Continuing	Continuing	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	199.809	90.685		127.318		51.178		2.670		53.848	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	**Project (Number/Name)** EB4 / *CIRCM*

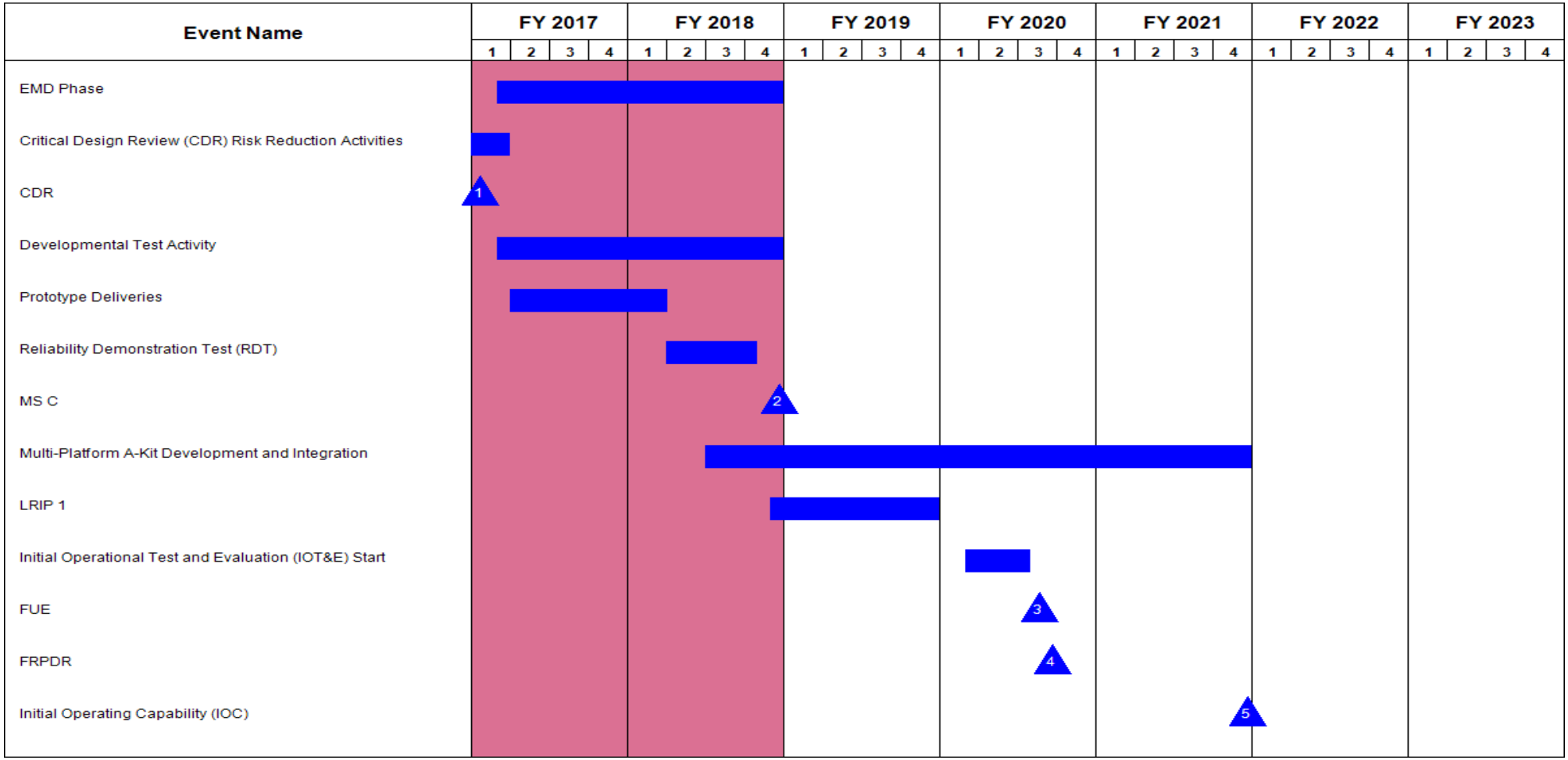

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605035A / *Common Infrared Countermeasures (CIRCM)*	**Project (Number/Name)** EB4 / *CIRCM*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Bridge Activity	4	2014	2	2015
EMD Contract Award/Protest	4	2015	1	2016
EMD Phase	1	2016	4	2018
Critical Design Review (CDR) Risk Reduction Activities	1	2016	1	2017
CDR	1	2017	1	2017
Developmental Test Activity	1	2016	4	2018
Prototype Deliveries	1	2016	1	2018
Reliability Demonstration Test (RDT)	2	2018	4	2018
MS C	4	2018	4	2018
Multi-Platform A-Kit Development and Integration	3	2018	4	2021
LRIP 1	4	2018	4	2019
Initial Operational Test and Evaluation (IOT&E) Start	1	2020	3	2020
FUE	3	2020	3	2020
FRPDR	3	2020	3	2020
Initial Operating Capability (IOC)	4	2021	4	2021