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**Department of Defense
Fiscal Year (FY) 2019 Budget Estimates**

February 2018



Army

Justification Book of

Research, Development, Test & Evaluation, Army

RDT&E – Volume II, Budget Activity 4

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Army • Budget Estimates FY 2019 • RDT&E Program

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RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY

APPROPRIATION LANGUAGE

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, \$10,484,483,000.00 to remain available for obligation until September 30, 2020.

The following Justification Books were prepared at a cost of \$226,413: Aircraft (ACFT), Missile (MSLS), Weapons & Tracked Combat Vehicles (WTCV), Ammunition (AMMO), Other Procurement Army (OPA) 1 - Tactical & Support Vehicles, Other Procurement Army (OPA) 2 – Communications & Electronics, Other Procurement Army (OPA) 3 & 4 - Other Support Equipment & Spares, Research, Development, Test and Evaluation (RDTE) for: Budget Activity 1, Budget Activity 2, Budget Activity 3, Budget Activity 4, Budget Activity 5A, Budget Activity 5B, Budget Activity 6, and Budget Activity 7.

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 (Dollars in Thousands)

18 Jan 2018

<u>Appropriation</u>	FY 2017 (Base + OCO)	FY 2018 PB Request with CR Adj Base	FY 2018 Total PB Requests* with CR Adj Base	FY 2018 PB Request with CR Adj OCO	FY 2018 Total PB Requests+ with CR Adj OCO
Research, Development, Test & Eval, Army	8,852,507	8,273,447	8,273,447	342,356	342,356
Total Research, Development, Test & Evaluation	8,852,507	8,273,447	8,273,447	342,356	342,356

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Appropriation	FY 2018	FY 2018	FY 2018	FY 2018	FY 2018	
	Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	Remaining Req Emergency	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	Remaining Req with CR Adj Base + OCO + Emergency
Research, Development, Test & Eval, Army	20,700	-20,700		8,636,503	-20,700	8,615,803
Total Research, Development, Test & Evaluation	20,700	-20,700		8,636,503	-20,700	8,615,803

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<u>Appropriation</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>
Research, Development, Test & Eval, Army	10,159,379	325,104	10,484,483
Total Research, Development, Test & Evaluation	10,159,379	325,104	10,484,483

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	FY 2017 (Base + OCO)	FY 2018 PB Request with CR Adj Base	FY 2018 Total PB Requests* with CR Adj Base	FY 2018 PB Request with CR Adj OCO	FY 2018 Total PB Requests* with CR Adj OCO
<u>Summary Recap of Budget Activities</u>					
Basic Research	473,216	430,022	430,022		
Applied Research	1,196,132	889,182	889,182		
Advanced Technology Development	1,351,035	1,070,977	1,070,977		
Advanced Component Development & Prototypes	619,976	890,889	890,889	18,000	18,000
System Development & Demonstration	2,502,560	3,012,840	3,012,840	57,840	57,840
RDT&E Management Support	1,413,481	1,253,845	1,253,845		
Operational Systems Development	1,296,107	1,877,685	1,877,685	43,528	43,528
Undistributed		-1,151,993	-1,151,993	222,988	222,988
Total Research, Development, Test & Evaluation	8,852,507	8,273,447	8,273,447	342,356	342,356
<u>Summary Recap of FYDP Programs</u>					
General Purpose Forces	611,072	710,401	710,401	15,000	15,000
Intelligence and Communications	342,648	370,519	370,519	29,728	29,728
Research and Development	7,826,372	8,215,942	8,215,942	74,640	74,640
Central Supply and Maintenance	59,891	60,877	60,877		
Administration and Associated Activities	7,899	-1,151,993	-1,151,993	222,988	222,988
Space		60,547	60,547		
Classified Programs	4,625	7,154	7,154		
Total Research, Development, Test & Evaluation	8,852,507	8,273,447	8,273,447	342,356	342,356

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Summary Recap of Budget Activities	FY 2018	FY 2018	FY 2018	FY 2018	FY 2018	
	Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req Emergency	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	Remaining Req with CR Adj Base + OCO + Emergency
Basic Research				430,022		430,022
Applied Research				889,182		889,182
Advanced Technology Development	12,000	-12,000		1,082,977	-12,000	1,070,977
Advanced Component Development & Prototypes	8,700	-8,700		917,589	-8,700	908,889
System Development & Demonstration				3,070,680		3,070,680
RDT&E Management Support				1,253,845		1,253,845
Operational Systems Development				1,921,213		1,921,213
Undistributed				-929,005		-929,005
Total Research, Development, Test & Evaluation	20,700	-20,700		8,636,503	-20,700	8,615,803
Summary Recap of FYDP Programs						
General Purpose Forces				725,401		725,401
Intelligence and Communications				400,247		400,247
Research and Development	20,700	-20,700		8,311,282	-20,700	8,290,582
Central Supply and Maintenance				60,877		60,877
Administration and Associated Activities				-929,005		-929,005
Space				60,547		60,547
Classified Programs				7,154		7,154
Total Research, Development, Test & Evaluation	20,700	-20,700		8,636,503	-20,700	8,615,803

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Summary Recap of Budget Activities	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Basic Research	445,895		445,895
Applied Research	919,609		919,609
Advanced Technology Development	1,026,698		1,026,698
Advanced Component Development & Prototypes	1,329,393	28,500	1,357,893
System Development & Demonstration	3,192,689	236,863	3,429,552
RDT&E Management Support	1,322,481		1,322,481
Operational Systems Development	1,922,614	59,741	1,982,355
Undistributed			
Total Research, Development, Test & Evaluation	10,159,379	325,104	10,484,483
Summary Recap of FYDP Programs			
General Purpose Forces	783,464	10,000	793,464
Intelligence and Communications	313,112	40,613	353,725
Research and Development	8,775,582	274,491	9,050,073
Central Supply and Maintenance	53,958		53,958
Administration and Associated Activities			
Space	227,308		227,308
Classified Programs	5,955		5,955
Total Research, Development, Test & Evaluation	10,159,379	325,104	10,484,483

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	FY 2017 (Base + OCO)	FY 2018 PB Request with CR Adj Base	FY 2018 Total PB Requests* with CR Adj Base	FY 2018 PB Request with CR Adj OCO	FY 2018 Total PB Requests+ with CR Adj OCO
<u>Summary Recap of Budget Activities</u>					
Basic Research	473,216	430,022	430,022		
Applied Research	1,196,132	889,182	889,182		
Advanced Technology Development	1,351,035	1,070,977	1,070,977		
Advanced Component Development & Prototypes	619,976	890,889	890,889	18,000	18,000
System Development & Demonstration	2,502,560	3,012,840	3,012,840	57,840	57,840
RDT&E Management Support	1,413,481	1,253,845	1,253,845		
Operational Systems Development	1,296,107	1,877,685	1,877,685	43,528	43,528
Undistributed		-1,151,993	-1,151,993	222,988	222,988
Total Research, Development, Test & Evaluation	8,852,507	8,273,447	8,273,447	342,356	342,356
<u>Summary Recap of FYDP Programs</u>					
General Purpose Forces	611,072	710,401	710,401	15,000	15,000
Intelligence and Communications	342,648	370,519	370,519	29,728	29,728
Research and Development	7,826,372	8,215,942	8,215,942	74,640	74,640
Central Supply and Maintenance	59,891	60,877	60,877		
Administration and Associated Activities	7,899	-1,151,993	-1,151,993	222,988	222,988
Space		60,547	60,547		
Classified Programs	4,625	7,154	7,154		
Total Research, Development, Test & Evaluation	8,852,507	8,273,447	8,273,447	342,356	342,356

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	FY 2018 Emergency Requests** Emergency	FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req Emergency	FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency**	FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req with CR Adj Base + OCO + Emergency
<u>Summary Recap of Budget Activities</u>						
Basic Research				430,022		430,022
Applied Research				889,182		889,182
Advanced Technology Development	12,000	-12,000		1,082,977	-12,000	1,070,977
Advanced Component Development & Prototypes	8,700	-8,700		917,589	-8,700	908,889
System Development & Demonstration				3,070,680		3,070,680
RDT&E Management Support				1,253,845		1,253,845
Operational Systems Development				1,921,213		1,921,213
Undistributed				-929,005		-929,005
Total Research, Development, Test & Evaluation	20,700	-20,700		8,636,503	-20,700	8,615,803
<u>Summary Recap of FYDP Programs</u>						
General Purpose Forces				725,401		725,401
Intelligence and Communications				400,247		400,247
Research and Development	20,700	-20,700		8,311,282	-20,700	8,290,582
Central Supply and Maintenance				60,877		60,877
Administration and Associated Activities				-929,005		-929,005
Space				60,547		60,547
Classified Programs				7,154		7,154
Total Research, Development, Test & Evaluation	20,700	-20,700		8,636,503	-20,700	8,615,803

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Summary Recap of Budget Activities	FY 2019 Base	FY 2019 OCO	FY 2019 Total
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Advanced Component Development & Prototypes	1,329,393	28,500	1,357,893
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Undistributed			
Total Research, Development, Test & Evaluation	10,159,379	325,104	10,484,483
Summary Recap of FYDP Programs			
General Purpose Forces	783,464	10,000	793,464
Intelligence and Communications	313,112	40,613	353,725
Research and Development	8,775,582	274,491	9,050,073
Central Supply and Maintenance	53,958		53,958
Administration and Associated Activities			
Space	227,308		227,308
Classified Programs	5,955		5,955
Total Research, Development, Test & Evaluation	10,159,379	325,104	10,484,483

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2017 (Base + OCO)	FY 2018 PB Request with CR Adj Base	FY 2018 Total PB Requests* with CR Adj Base	FY 2018 PB Request with CR Adj OCO	FY 2018 Total PB Requests+ with CR Adj OCO	S e c
1	0601101A	In-House Laboratory Research	01	11,936	12,010	12,010			U
2	0601102A	Defense Research Sciences	01	286,086	263,590	263,590			U
3	0601103A	University Research Initiatives	01	66,506	67,027	67,027			U
4	0601104A	University and Industry Research Centers	01	108,688	87,395	87,395			U
		Basic Research		473,216	430,022	430,022			
5	0602105A	Materials Technology	02	81,950	29,640	29,640			U
6	0602120A	Sensors and Electronic Survivability	02	50,574	35,730	35,730			U
7	0602122A	TRACTOR HIP	02	6,995	8,627	8,627			U
8	0602126A	TRACTOR JACK	02						U
9	0602211A	Aviation Technology	02	67,593	66,086	66,086			U
10	0602270A	Electronic Warfare Technology	02	34,528	27,144	27,144			U
11	0602303A	Missile Technology	02	66,173	43,742	43,742			U
12	0602307A	Advanced Weapons Technology	02	52,766	22,785	22,785			U
13	0602308A	Advanced Concepts and Simulation	02	29,767	28,650	28,650			U
14	0602601A	Combat Vehicle and Automotive Technology	02	89,852	67,232	67,232			U
15	0602618A	Ballistics Technology	02	103,484	85,309	85,309			U
16	0602622A	Chemical, Smoke and Equipment Defeating Technology	02	3,772	4,004	4,004			U
17	0602623A	Joint Service Small Arms Program	02	5,331	5,615	5,615			U

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Line No	Program Element Number	Item	Act	FY 2018	FY 2018	FY 2018	FY 2018	FY 2018	S	
				Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	Emergency Remaining Req	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs		Remaining Req with CR Adj Base + OCO + Emergency
1	0601101A	In-House Laboratory Independent Research	01				12,010		12,010	U
2	0601102A	Defense Research Sciences	01				263,590		263,590	U
3	0601103A	University Research Initiatives	01				67,027		67,027	U
4	0601104A	University and Industry Research Centers	01				87,395		87,395	U
		Basic Research					430,022		430,022	
5	0602105A	Materials Technology	02				29,640		29,640	U
6	0602120A	Sensors and Electronic Survivability	02				35,730		35,730	U
7	0602122A	TRACTOR HIP	02				8,627		8,627	U
8	0602126A	TRACTOR JACK	02							U
9	0602211A	Aviation Technology	02				66,086		66,086	U
10	0602270A	Electronic Warfare Technology	02				27,144		27,144	U
11	0602303A	Missile Technology	02				43,742		43,742	U
12	0602307A	Advanced Weapons Technology	02				22,785		22,785	U
13	0602308A	Advanced Concepts and Simulation	02				28,650		28,650	U
14	0602601A	Combat Vehicle and Automotive Technology	02				67,232		67,232	U
15	0602618A	Ballistics Technology	02				85,309		85,309	U
16	0602622A	Chemical, Smoke and Equipment Defeating Technology	02				4,004		4,004	U
17	0602623A	Joint Service Small Arms Program	02				5,615		5,615	U

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Se
1	0601101A	In-House Laboratory Independent Research	01	11,585		11,585	U
2	0601102A	Defense Research Sciences	01	276,912		276,912	U
3	0601103A	University Research Initiatives	01	65,283		65,283	U
4	0601104A	University and Industry Research Centers	01	92,115		92,115	U
		Basic Research		445,895		445,895	
5	0602105A	Materials Technology	02	28,600		28,600	U
6	0602120A	Sensors and Electronic Survivability	02	32,366		32,366	U
7	0602122A	TRACTOR HIP	02	8,674		8,674	U
8	0602126A	TRACTOR JACK	02	400		400	U
9	0602211A	Aviation Technology	02	64,847		64,847	U
10	0602270A	Electronic Warfare Technology	02	25,571		25,571	U
11	0602303A	Missile Technology	02	50,183		50,183	U
12	0602307A	Advanced Weapons Technology	02	29,502		29,502	U
13	0602308A	Advanced Concepts and Simulation	02	28,500		28,500	U
14	0602601A	Combat Vehicle and Automotive Technology	02	70,450		70,450	U
15	0602618A	Ballistics Technology	02	75,541		75,541	U
16	0602622A	Chemical, Smoke and Equipment Defeating Technology	02	5,032		5,032	U
17	0602623A	Joint Service Small Arms Program	02	12,394		12,394	U

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Line No	Program Element Number	Item	Act	FY 2017 (Base + OCO)	FY 2018 PB Request with CR Adj Base	FY 2018 Total PB Requests* with CR Adj Base	FY 2018 PB Request with CR Adj OCO	FY 2018 Total PB Requests* with CR Adj OCO	S e c
18	0602624A	Weapons and Munitions Technology	02	118,068	41,455	41,455			U
19	0602705A	Electronics and Electronic Devices	02	72,979	58,352	58,352			U
20	0602709A	Night Vision Technology	02	34,762	34,723	34,723			U
21	0602712A	Countermines Systems	02	29,495	26,190	26,190			U
22	0602716A	Human Factors Engineering Technology	02	23,359	24,127	24,127			U
23	0602720A	Environmental Quality Technology	02	21,553	21,678	21,678			U
24	0602782A	Command, Control, Communications Technology	02	36,396	33,123	33,123			U
25	0602783A	Computer and Software Technology	02	13,452	14,041	14,041			U
26	0602784A	Military Engineering Technology	02	92,140	67,720	67,720			U
27	0602785A	Manpower/Personnel/Training Technology	02	23,475	20,216	20,216			U
28	0602786A	Warfighter Technology	02	59,327	39,559	39,559			U
29	0602787A	Medical Technology	02	78,341	83,434	83,434			U
		Applied Research		1,196,132	889,182	889,182			
30	0603001A	Warfighter Advanced Technology	03	50,004	44,863	44,863			U
31	0603002A	Medical Advanced Technology	03	106,040	67,780	67,780			U
32	0603003A	Aviation Advanced Technology	03	111,654	160,746	160,746			U
33	0603004A	Weapons and Munitions Advanced Technology	03	198,245	84,079	84,079			U
34	0603005A	Combat Vehicle and Automotive Advanced Technology	03	163,501	125,537	125,537			U

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Line No	Program Element Number	Item	Act	FY 2018 Emergency Requests**	FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req Emergency	FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency**	FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req with CR Adj Base + OCO + Emergency	S e c
18	0602624A	Weapons and Munitions Technology	02				41,455		41,455	U
19	0602705A	Electronics and Electronic Devices	02				58,352		58,352	U
20	0602709A	Night Vision Technology	02				34,723		34,723	U
21	0602712A	Countermine Systems	02				26,190		26,190	U
22	0602716A	Human Factors Engineering Technology	02				24,127		24,127	U
23	0602720A	Environmental Quality Technology	02				21,678		21,678	U
24	0602782A	Command, Control, Communications Technology	02				33,123		33,123	U
25	0602783A	Computer and Software Technology	02				14,041		14,041	U
26	0602784A	Military Engineering Technology	02				67,720		67,720	U
27	0602785A	Manpower/Personnel/Training Technology	02				20,216		20,216	U
28	0602786A	Warfighter Technology	02				39,559		39,559	U
29	0602787A	Medical Technology	02				83,434		83,434	U
	Applied Research						889,182		889,182	
30	0603001A	Warfighter Advanced Technology	03				44,863		44,863	U
31	0603002A	Medical Advanced Technology	03				67,780		67,780	U
32	0603003A	Aviation Advanced Technology	03				160,746		160,746	U
33	0603004A	Weapons and Munitions Advanced Technology	03				84,079		84,079	U
34	0603005A	Combat Vehicle and Automotive Advanced Technology	03				125,537		125,537	U

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Line No	Program Element Number	Item	Act	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Se c
18	0602624A	Weapons and Munitions Technology	02	40,444		40,444	U
19	0602705A	Electronics and Electronic Devices	02	58,283		58,283	U
20	0602709A	Night Vision Technology	02	29,582		29,582	U
21	0602712A	Countermine Systems	02	21,244		21,244	U
22	0602716A	Human Factors Engineering Technology	02	24,131		24,131	U
23	0602720A	Environmental Quality Technology	02	13,242		13,242	U
24	0602782A	Command, Control, Communications Technology	02	55,003		55,003	U
25	0602783A	Computer and Software Technology	02	14,958		14,958	U
26	0602784A	Military Engineering Technology	02	78,159		78,159	U
27	0602785A	Manpower/Personnel/Training Technology	02	21,862		21,862	U
28	0602786A	Warfighter Technology	02	40,566		40,566	U
29	0602787A	Medical Technology	02	90,075		90,075	U
		Applied Research		919,609		919,609	
30	0603001A	Warfighter Advanced Technology	03	39,338		39,338	U
31	0603002A	Medical Advanced Technology	03	62,496		62,496	U
32	0603003A	Aviation Advanced Technology	03	124,958		124,958	U
33	0603004A	Weapons and Munitions Advanced Technology	03	102,686		102,686	U
34	0603005A	Combat Vehicle and Automotive Advanced Technology	03	119,739		119,739	U

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35	0603006A	Space Application Advanced Technology	03	3,787	12,231	12,231			U
36	0603007A	Manpower, Personnel and Training Advanced Technology	03	12,110	6,466	6,466			U
37	0603009A	TRACTOR HIKE	03	21,374	28,552	28,552			U
38	0603015A	Next Generation Training & Simulation Systems	03	18,238	16,434	16,434			U
39	0603020A	TRACTOR ROSE	03	11,910					U
40	0603125A	Combating Terrorism - Technology Development	03	33,553	26,903	26,903			U
41	0603130A	TRACTOR NAIL	03	2,340	4,880	4,880			U
42	0603131A	TRACTOR EGGS	03	2,470	4,326	4,326			U
43	0603270A	Electronic Warfare Technology	03	40,819	31,296	31,296			U
44	0603313A	Missile and Rocket Advanced Technology	03	113,683	62,850	62,850			U
45	0603322A	TRACTOR CAGE	03	11,107	12,323	12,323			U
46	0603461A	High Performance Computing Modernization Program	03	215,462	182,331	182,331			U
47	0603606A	Landmine Warfare and Barrier Advanced Technology	03	16,798	17,948	17,948			U
48	0603607A	Joint Service Small Arms Program	03	5,615	5,796	5,796			U
49	0603710A	Night Vision Advanced Technology	03	42,798	47,135	47,135			U
50	0603728A	Environmental Quality Technology Demonstrations	03	21,415	10,421	10,421			U

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35	0603006A	Space Application Advanced Technology	03				12,231		12,231	U
36	0603007A	Manpower, Personnel and Training Advanced Technology	03				6,466		6,466	U
37	0603009A	TRACTOR HIKE	03	12,000	-12,000		40,552	-12,000	28,552	U
38	0603015A	Next Generation Training & Simulation Systems	03				16,434		16,434	U
39	0603020A	TRACTOR ROSE	03							U
40	0603125A	Combating Terrorism - Technology Development	03				26,903		26,903	U
41	0603130A	TRACTOR NAIL	03				4,880		4,880	U
42	0603131A	TRACTOR EGGS	03				4,326		4,326	U
43	0603270A	Electronic Warfare Technology	03				31,296		31,296	U
44	0603313A	Missile and Rocket Advanced Technology	03				62,850		62,850	U
45	0603322A	TRACTOR CAGE	03				12,323		12,323	U
46	0603461A	High Performance Computing Modernization Program	03				182,331		182,331	U
47	0603606A	Landmine Warfare and Barrier Advanced Technology	03				17,948		17,948	U
48	0603607A	Joint Service Small Arms Program	03				5,796		5,796	U
49	0603710A	Night Vision Advanced Technology	03				47,135		47,135	U
50	0603728A	Environmental Quality Technology Demonstrations	03				10,421		10,421	U

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35	0603006A	Space Application Advanced Technology	03	13,000		13,000	U
36	0603007A	Manpower, Personnel and Training Advanced Technology	03	8,044		8,044	U
37	0603009A	TRACTOR HIKE	03	22,631		22,631	U
38	0603015A	Next Generation Training & Simulation Systems	03	25,682		25,682	U
39	0603020A	TRACTOR ROSE	03				U
40	0603125A	Combating Terrorism - Technology Development	03	3,762		3,762	U
41	0603130A	TRACTOR NAIL	03	4,896		4,896	U
42	0603131A	TRACTOR EGGS	03	6,041		6,041	U
43	0603270A	Electronic Warfare Technology	03	31,491		31,491	U
44	0603313A	Missile and Rocket Advanced Technology	03	61,132		61,132	U
45	0603322A	TRACTOR CAGE	03	16,845		16,845	U
46	0603461A	High Performance Computing Modernization Program	03	183,322		183,322	U
47	0603606A	Landmine Warfare and Barrier Advanced Technology	03	11,104		11,104	U
48	0603607A	Joint Service Small Arms Program	03	5,885		5,885	U
49	0603710A	Night Vision Advanced Technology	03	61,376		61,376	U
50	0603728A	Environmental Quality Technology Demonstrations	03	9,136		9,136	U

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51	0603734A	Military Engineering Advanced Technology	03	59,101	32,448	32,448			U
52	0603772A	Advanced Tactical Computer Science and Sensor Technology	03	52,572	52,206	52,206			U
53	0603794A	C3 Advanced Technology	03	36,439	33,426	33,426			U
		Advanced Technology Development		1,351,035	1,070,977	1,070,977			
54	0603305A	Army Missile Defense Systems Integration	04	39,395	9,634	9,634			U
55	0603308A	Army Space Systems Integration	04	32,278					U
56	0603327A	Air and Missile Defense Systems Engineering	04	6,100	33,949	33,949	15,000	15,000	U
57	0603619A	Landmine Warfare and Barrier - Adv Dev	04	65,062	72,909	72,909			U
58	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04	43,177	7,135	7,135			U
59	0603639A	Tank and Medium Caliber Ammunition	04	47,745	41,452	41,452			U
60	0603645A	Armored System Modernization - Adv Dev	04		32,739	32,739			U
61	0603747A	Soldier Support and Survivability	04	13,607	10,157	10,157	3,000	3,000	U
62	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	15,730	27,733	27,733			U
63	0603774A	Night Vision Systems Advanced Development	04	9,930	12,347	12,347			U
64	0603779A	Environmental Quality Technology - Dem/Val	04	7,480	10,456	10,456			U

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				Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	Remaining Req	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs		Remaining Req with CR Adj Base + OCO + Emergency
51	0603734A	Military Engineering Advanced Technology	03				32,448		32,448	U
52	0603772A	Advanced Tactical Computer Science and Sensor Technology	03				52,206		52,206	U
53	0603794A	C3 Advanced Technology	03				33,426		33,426	U
		Advanced Technology Development		12,000	-12,000		1,082,977	-12,000	1,070,977	
54	0603305A	Army Missile Defense Systems Integration	04				9,634		9,634	U
55	0603308A	Army Space Systems Integration	04							U
56	0603327A	Air and Missile Defense Systems Engineering	04	8,700	-8,700		57,649	-8,700	48,949	U
57	0603619A	Landmine Warfare and Barrier - Adv Dev	04				72,909		72,909	U
58	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04				7,135		7,135	U
59	0603639A	Tank and Medium Caliber Ammunition	04				41,452		41,452	U
60	0603645A	Armored System Modernization - Adv Dev	04				32,739		32,739	U
61	0603747A	Soldier Support and Survivability	04				13,157		13,157	U
62	0603766A	Tactical Electronic Surveillance System - Adv Dev	04				27,733		27,733	U
63	0603774A	Night Vision Systems Advanced Development	04				12,347		12,347	U
64	0603779A	Environmental Quality Technology - Dem/Val	04				10,456		10,456	U

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51	0603734A	Military Engineering Advanced Technology	03	25,864		25,864	U
52	0603772A	Advanced Tactical Computer Science and Sensor Technology	03	34,883		34,883	U
53	0603794A	C3 Advanced Technology	03	52,387		52,387	U
		Advanced Technology Development		1,026,698		1,026,698	
54	0603305A	Army Missile Defense Systems Integration	04	10,777		10,777	U
55	0603308A	Army Space Systems Integration	04				U
56	0603327A	Air and Missile Defense Systems Engineering	04	42,802	1,000	43,802	U
57	0603619A	Landmine Warfare and Barrier - Adv Dev	04	45,254		45,254	U
58	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04	22,700	1,500	24,200	U
59	0603639A	Tank and Medium Caliber Ammunition	04	41,974		41,974	U
60	0603645A	Armored System Modernization - Adv Dev	04	119,395		119,395	U
61	0603747A	Soldier Support and Survivability	04	8,746	3,000	11,746	U
62	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	35,667		35,667	U
63	0603774A	Night Vision Systems Advanced Development	04	7,350		7,350	U
64	0603779A	Environmental Quality Technology - Dem/Val	04	14,749		14,749	U

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65	0603790A	NATO Research and Development	04	2,211	2,588	2,588			U
66	0603801A	Aviation - Adv Dev	04	7,702	14,055	14,055			U
67	0603804A	Logistics and Engineer Equipment - Adv Dev	04	17,445	35,333	35,333			U
68	0603807A	Medical Systems - Adv Dev	04	47,336	33,491	33,491			U
69	0603827A	Soldier Systems - Advanced Development	04	54,497	20,239	20,239			U
70	0604017A	Robotics Development	04		39,608	39,608			U
71	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04						U
72	0604100A	Analysis Of Alternatives	04	6,354	9,921	9,921			U
73	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04						U
74	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	33,780	76,728	76,728			U
75	0604115A	Technology Maturation Initiatives	04	57,737	115,221	115,221			U
76	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04		20,000	20,000			U
77	0604118A	TRACTOR BEAM	04		10,400	10,400			U
78	0604120A	Assured Positioning, Navigation and Timing (PNT)	04	83,074	164,967	164,967			U
79	0604121A	Synthetic Training Environment Refinement & Prototyping	04		1,600	1,600			U

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				FY 2018 Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req Emergency	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	
65	0603790A	NATO Research and Development	04				2,588		2,588 U
66	0603801A	Aviation - Adv Dev	04				14,055		14,055 U
67	0603804A	Logistics and Engineer Equipment - Adv Dev	04				35,333		35,333 U
68	0603807A	Medical Systems - Adv Dev	04				33,491		33,491 U
69	0603827A	Soldier Systems - Advanced Development	04				20,239		20,239 U
70	0604017A	Robotics Development	04				39,608		39,608 U
71	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04						U
72	0604100A	Analysis Of Alternatives	04				9,921		9,921 U
73	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04						U
74	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04				76,728		76,728 U
75	0604115A	Technology Maturation Initiatives	04				115,221		115,221 U
76	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04				20,000		20,000 U
77	0604118A	TRACTOR BEAM	04				10,400		10,400 U
78	0604120A	Assured Positioning, Navigation and Timing (PNT)	04				164,967		164,967 U
79	0604121A	Synthetic Training Environment Refinement & Prototyping	04				1,600		1,600 U

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65	0603790A	NATO Research and Development	04	3,687		3,687	U
66	0603801A	Aviation - Adv Dev	04	10,793		10,793	U
67	0603804A	Logistics and Engineer Equipment - Adv Dev	04	14,248		14,248	U
68	0603807A	Medical Systems - Adv Dev	04	34,284		34,284	U
69	0603827A	Soldier Systems - Advanced Development	04	18,044		18,044	U
70	0604017A	Robotics Development	04	95,660		95,660	U
71	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04	38,000		38,000	U
72	0604100A	Analysis Of Alternatives	04	9,765		9,765	U
73	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	12,393		12,393	U
74	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	120,374		120,374	U
75	0604115A	Technology Maturation Initiatives	04	95,347		95,347	U
76	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	95,085	23,000	118,085	U
77	0604118A	TRACTOR BEAM	04	52,894		52,894	U
78	0604120A	Assured Positioning, Navigation and Timing (PNT)	04				U
79	0604121A	Synthetic Training Environment Refinement & Prototyping	04	77,939		77,939	U

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80	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04		11,303	11,303			U
81	0305251A	Cyberspace Operations Forces and Force Support	04	29,336	56,492	56,492			U
82	1206120A	Assured Positioning, Navigation and Timing (PNT)	04						U
83	1206308A	Army Space Systems Integration	04		20,432	20,432			U
		Advanced Component Development & Prototypes		619,976	890,889	890,889	18,000	18,000	
84	0604201A	Aircraft Avionics	05	54,915	30,153	30,153			U
85	0604270A	Electronic Warfare Development	05	33,419	71,671	71,671			U
86	0604290A	Mid-tier Networking Vehicular Radio (MNVR)	05	9,363	10,589	10,589			U
87	0604321A	All Source Analysis System	05	11,958	4,774	4,774			U
88	0604328A	TRACTOR CAGE	05	12,525	17,252	17,252			U
89	0604601A	Infantry Support Weapons	05	63,842	87,643	87,643			U
90	0604604A	Medium Tactical Vehicles	05		6,039	6,039			U
91	0604611A	JAVELIN	05	19,241	21,095	21,095			U
92	0604622A	Family of Heavy Tactical Vehicles	05	10,989	10,507	10,507			U
93	0604633A	Air Traffic Control	05	3,326	3,536	3,536			U
94	0604641A	Tactical Unmanned Ground Vehicle (TUGV)	05	32,315					U
95	0604642A	Light Tactical Wheeled Vehicles	05	476	7,000	7,000			U

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				Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	Remaining Req Emergency	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs		Remaining Req with CR Adj Base + OCO + Emergency
80	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04				11,303		11,303	U
81	0305251A	Cyberspace Operations Forces and Force Support	04				56,492		56,492	U
82	1206120A	Assured Positioning, Navigation and Timing (PNT)	04							U
83	1206308A	Army Space Systems Integration	04				20,432		20,432	U
	Advanced Component Development & Prototypes			8,700	-8,700		917,589	-8,700	908,889	
84	0604201A	Aircraft Avionics	05				30,153		30,153	U
85	0604270A	Electronic Warfare Development	05				71,671		71,671	U
86	0604290A	Mid-tier Networking Vehicular Radio (MNVR)	05				10,589		10,589	U
87	0604321A	All Source Analysis System	05				4,774		4,774	U
88	0604328A	TRACTOR CAGE	05				17,252		17,252	U
89	0604601A	Infantry Support Weapons	05				87,643		87,643	U
90	0604604A	Medium Tactical Vehicles	05				6,039		6,039	U
91	0604611A	JAVELIN	05				21,095		21,095	U
92	0604622A	Family of Heavy Tactical Vehicles	05				10,507		10,507	U
93	0604633A	Air Traffic Control	05				3,536		3,536	U
94	0604641A	Tactical Unmanned Ground Vehicle (TUGV)	05							U
95	0604642A	Light Tactical Wheeled Vehicles	05				7,000		7,000	U

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80	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04	51,030		51,030	U
81	0305251A	Cyberspace Operations Forces and Force Support	04	65,817		65,817	U
82	1206120A	Assured Positioning, Navigation and Timing (PNT)	04	146,300		146,300	U
83	1206308A	Army Space Systems Integration	04	38,319		38,319	U
	Advanced Component Development & Prototypes			1,329,393	28,500	1,357,893	
84	0604201A	Aircraft Avionics	05	32,293		32,293	U
85	0604270A	Electronic Warfare Development	05	78,699		78,699	U
86	0604290A	Mid-tier Networking Vehicular Radio (MNVR)	05				U
87	0604321A	All Source Analysis System	05				U
88	0604328A	TRACTOR CAGE	05	17,050	12,000	29,050	U
89	0604601A	Infantry Support Weapons	05	83,155		83,155	U
90	0604604A	Medium Tactical Vehicles	05	3,704		3,704	U
91	0604611A	JAVELIN	05	10,623		10,623	U
92	0604622A	Family of Heavy Tactical Vehicles	05	11,950		11,950	U
93	0604633A	Air Traffic Control	05	12,347		12,347	U
94	0604641A	Tactical Unmanned Ground Vehicle (TUGV)	05				U
95	0604642A	Light Tactical Wheeled Vehicles	05	8,212		8,212	U

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Line No	Program Element Number	Item	Act	FY 2017 (Base + OCO)	FY 2018 PB Request with CR Adj Base	FY 2018 Total PB Requests* with CR Adj Base	FY 2018 PB Request with CR Adj OCO	FY 2018 Total PB Requests+ with CR Adj OCO	S e c
96	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	9,306	36,242	36,242			U
97	0604710A	Night Vision Systems - Eng Dev	05	76,491	108,504	108,504			U
98	0604713A	Combat Feeding, Clothing, and Equipment	05	1,975	3,702	3,702			U
99	0604715A	Non-System Training Devices - Eng Dev	05	33,888	43,575	43,575			U
100	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	200,205	28,726	28,726			U
101	0604742A	Constructive Simulation Systems Development	05	17,363	18,562	18,562			U
102	0604746A	Automatic Test Equipment Development	05	8,503	8,344	8,344			U
103	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	10,150	11,270	11,270			U
104	0604768A	Brilliant Anti-Armor Submunition (BAT)	05		10,000	10,000			U
105	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	14,538	18,566	18,566			U
106	0604798A	Brigade Analysis, Integration and Evaluation	05	101,927	145,360	145,360			U
107	0604802A	Weapons and Munitions - Eng Dev	05	75,845	145,232	145,232			U
108	0604804A	Logistics and Engineer Equipment - Eng Dev	05	76,374	90,965	90,965			U
109	0604805A	Command, Control, Communications Systems - Eng Dev	05	4,166	9,910	9,910			U

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Line No	Program Element Number	Item	Act	FY 2018 Emergency Requests**	FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req Emergency	FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency**	FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req with CR Adj Base + OCO + e Emergency	S c
96	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05				36,242		36,242	U
97	0604710A	Night Vision Systems - Eng Dev	05				108,504		108,504	U
98	0604713A	Combat Feeding, Clothing, and Equipment	05				3,702		3,702	U
99	0604715A	Non-System Training Devices - Eng Dev	05				43,575		43,575	U
100	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05				28,726		28,726	U
101	0604742A	Constructive Simulation Systems Development	05				18,562		18,562	U
102	0604746A	Automatic Test Equipment Development	05				8,344		8,344	U
103	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05				11,270		11,270	U
104	0604768A	Brilliant Anti-Armor Submunition (BAT)	05				10,000		10,000	U
105	0604780A	Combined Arms Tactical Trainer (CATT) Core	05				18,566		18,566	U
106	0604798A	Brigade Analysis, Integration and Evaluation	05				145,360		145,360	U
107	0604802A	Weapons and Munitions - Eng Dev	05				145,232		145,232	U
108	0604804A	Logistics and Engineer Equipment - Eng Dev	05				90,965		90,965	U
109	0604805A	Command, Control, Communications Systems - Eng Dev	05				9,910		9,910	U

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96	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	393,613		393,613	U
97	0604710A	Night Vision Systems - Eng Dev	05	139,614		139,614	U
98	0604713A	Combat Feeding, Clothing, and Equipment	05	4,507		4,507	U
99	0604715A	Non-System Training Devices - Eng Dev	05	49,436		49,436	U
100	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	95,172	119,300	214,472	U
101	0604742A	Constructive Simulation Systems Development	05	22,628		22,628	U
102	0604746A	Automatic Test Equipment Development	05	13,297		13,297	U
103	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	9,145		9,145	U
104	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	9,894		9,894	U
105	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	21,964		21,964	U
106	0604798A	Brigade Analysis, Integration and Evaluation	05	49,288		49,288	U
107	0604802A	Weapons and Munitions - Eng Dev	05	183,100		183,100	U
108	0604804A	Logistics and Engineer Equipment - Eng Dev	05	79,706		79,706	U
109	0604805A	Command, Control, Communications Systems - Eng Dev	05	15,970		15,970	U

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110	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	36,237	39,238	39,238			U
111	0604808A	Landmine Warfare/Barrier - Eng Dev	05	32,069	34,684	34,684			U
112	0604818A	Army Tactical Command & Control Hardware & Software	05	169,375	164,409	164,409			U
113	0604820A	Radar Development	05	15,368	32,968	32,968			U
114	0604822A	General Fund Enterprise Business System (GFEBs)	05	11,044	49,554	49,554			U
115	0604823A	Firefinder	05	6,177	45,605	45,605			U
116	0604827A	Soldier Systems - Warrior Dem/Val	05	11,929	16,127	16,127			U
117	0604852A	Suite of Survivability Enhancement Systems - EMD	05		98,600	98,600			U
118	0604854A	Artillery Systems - EMD	05	1,689	1,972	1,972			U
119	0605013A	Information Technology Development	05	70,104	81,776	81,776			U
120	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	149,597	172,361	172,361			U
121	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	177,133	199,778	199,778			U
122	0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05	4,789	4,418	4,418			U
123	0605030A	Joint Tactical Network Center (JTNC)	05	14,463	15,877	15,877			U
124	0605031A	Joint Tactical Network (JTN)	05	16,430	44,150	44,150			U
125	0605032A	TRACTOR TIRE	05	27,254	34,670	34,670	5,000	5,000	U

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				Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	Remaining Req	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs		Remaining Req with CR Adj Base + OCO + Emergency
110	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05				39,238		39,238	U
111	0604808A	Landmine Warfare/Barrier - Eng Dev	05				34,684		34,684	U
112	0604818A	Army Tactical Command & Control Hardware & Software	05				164,409		164,409	U
113	0604820A	Radar Development	05				32,968		32,968	U
114	0604822A	General Fund Enterprise Business System (GFEBS)	05				49,554		49,554	U
115	0604823A	Firefinder	05				45,605		45,605	U
116	0604827A	Soldier Systems - Warrior Dem/Val	05				16,127		16,127	U
117	0604852A	Suite of Survivability Enhancement Systems - EMD	05				98,600		98,600	U
118	0604854A	Artillery Systems - EMD	05				1,972		1,972	U
119	0605013A	Information Technology Development	05				81,776		81,776	U
120	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05				172,361		172,361	U
121	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05				199,778		199,778	U
122	0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05				4,418		4,418	U
123	0605030A	Joint Tactical Network Center (JTNC)	05				15,877		15,877	U
124	0605031A	Joint Tactical Network (JTN)	05				44,150		44,150	U
125	0605032A	TRACTOR TIRE	05				39,670		39,670	U

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110	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	44,542		44,542	U
111	0604808A	Landmine Warfare/Barrier - Eng Dev	05	50,817		50,817	U
112	0604818A	Army Tactical Command & Control Hardware & Software	05	178,693		178,693	U
113	0604820A	Radar Development	05	39,338		39,338	U
114	0604822A	General Fund Enterprise Business System (GFEBs)	05	37,851		37,851	U
115	0604823A	Firefinder	05	45,473		45,473	U
116	0604827A	Soldier Systems - Warrior Dem/Val	05	10,395		10,395	U
117	0604852A	Suite of Survivability Enhancement Systems - EMD	05	69,204		69,204	U
118	0604854A	Artillery Systems - EMD	05	1,781		1,781	U
119	0605013A	Information Technology Development	05	113,758		113,758	U
120	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	166,603		166,603	U
121	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	118,239		118,239	U
122	0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05	3,211		3,211	U
123	0605030A	Joint Tactical Network Center (JTNC)	05	15,889		15,889	U
124	0605031A	Joint Tactical Network (JTN)	05	41,972		41,972	U
125	0605032A	TRACTOR TIRE	05	41,166	66,760	107,926	U

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126	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	4,838	5,207	5,207			U
127	0605034A	Tactical Security System (TSS)	05	2,792	4,727	4,727			U
128	0605035A	Common Infrared Countermeasures (CIRCM)	05	90,685	105,778	105,778	21,540	21,540	U
129	0605036A	Combating Weapons of Mass Destruction (CWMD)	05	2,008	6,927	6,927			U
130	0605037A	Evidence Collection and Detainee Processing	05		214	214			U
131	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05		16,125	16,125			U
132	0605041A	Defensive CYBER Tool Development	05	32,535	55,165	55,165			U
133	0605042A	Tactical Network Radio Systems (Low-Tier)	05	14,198	20,076	20,076			U
134	0605047A	Contract Writing System	05	19,868	20,322	20,322			U
135	0605049A	Missile Warning System Modernization (MWSM)	05		55,810	55,810			U
136	0605051A	Aircraft Survivability Development	05	121,530	30,879	30,879	30,100	30,100	U
137	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	80,781	175,069	175,069			U
138	0605053A	Ground Robotics	05		70,760	70,760			U
139	0605054A	Emerging Technology Initiatives	05						U

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				Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	Remaining Req Emergency	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	
126	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05				5,207	5,207	U
127	0605034A	Tactical Security System (TSS)	05				4,727	4,727	U
128	0605035A	Common Infrared Countermeasures (CIRCM)	05				127,318	127,318	U
129	0605036A	Combating Weapons of Mass Destruction (CWMD)	05				6,927	6,927	U
130	0605037A	Evidence Collection and Detainee Processing	05				214	214	U
131	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05				16,125	16,125	U
132	0605041A	Defensive CYBER Tool Development	05				55,165	55,165	U
133	0605042A	Tactical Network Radio Systems (Low-Tier)	05				20,076	20,076	U
134	0605047A	Contract Writing System	05				20,322	20,322	U
135	0605049A	Missile Warning System Modernization (MWSM)	05				55,810	55,810	U
136	0605051A	Aircraft Survivability Development	05				60,979	60,979	U
137	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05				175,069	175,069	U
138	0605053A	Ground Robotics	05				70,760	70,760	U
139	0605054A	Emerging Technology Initiatives	05						U

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126	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	5,175		5,175	U
127	0605034A	Tactical Security System (TSS)	05	4,496		4,496	U
128	0605035A	Common Infrared Countermeasures (CIRCM)	05	51,178	2,670	53,848	U
129	0605036A	Combating Weapons of Mass Destruction (CWMD)	05	11,311		11,311	U
130	0605037A	Evidence Collection and Detainee Processing	05				U
131	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	17,154		17,154	U
132	0605041A	Defensive CYBER Tool Development	05	36,626		36,626	U
133	0605042A	Tactical Network Radio Systems (Low-Tier)	05	3,829		3,829	U
134	0605047A	Contract Writing System	05	41,928		41,928	U
135	0605049A	Missile Warning System Modernization (MWSM)	05	28,276		28,276	U
136	0605051A	Aircraft Survivability Development	05	21,965	34,933	56,898	U
137	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	157,710		157,710	U
138	0605053A	Ground Robotics	05	86,167		86,167	U
139	0605054A	Emerging Technology Initiatives	05	42,866		42,866	U

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140	0605380A	AMF Joint Tactical Radio System (JTRS)	05	4,088	8,965	8,965			U
141	0605450A	Joint Air-to-Ground Missile (JAGM)	05	47,446	34,626	34,626			U
142	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	273,240	336,420	336,420			U
143	0605766A	National Capabilities Integration (MIP)	05	4,955	6,882	6,882			U
144	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	11,086	23,467	23,467			U
145	0605830A	Aviation Ground Support Equipment	05	2,060	6,930	6,930			U
146	0210609A	Paladin Integrated Management (PIM)	05	39,902	6,112	6,112			U
147	0303032A	TROJAN - RH12	05	4,273	4,431	4,431	1,200	1,200	U
148	0303267A	Auctioned Spectrum Relocation Fund	05	34,967					U
149	0303367A	Spectrum Access Research and Development	05	66,125					U
150	0304270A	Electronic Warfare Development	05	18,425	14,616	14,616			U
151	1205117A	Tractor Bears	05		17,928	17,928			U
		System Development & Demonstration		2,502,560	3,012,840	3,012,840	57,840	57,840	
152	0604256A	Threat Simulator Development	06	28,883	22,862	22,862			U
153	0604258A	Target Systems Development	06	18,518	13,902	13,902			U
154	0604759A	Major T&E Investment	06	93,668	102,901	102,901			U
155	0605103A	Rand Arroyo Center	06	19,863	20,140	20,140			U

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				Emergency Requests**	Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	Emergency	Total PB Requests* with CR Adj Base + OCO + Emergency**	Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs		Remaining Req with CR Adj Base + OCO + Emergency
140	0605380A	AMF Joint Tactical Radio System (JTRS)	05				8,965		8,965	U
141	0605450A	Joint Air-to-Ground Missile (JAGM)	05				34,626		34,626	U
142	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05				336,420		336,420	U
143	0605766A	National Capabilities Integration (MIP)	05				6,882		6,882	U
144	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05				23,467		23,467	U
145	0605830A	Aviation Ground Support Equipment	05				6,930		6,930	U
146	0210609A	Paladin Integrated Management (PIM)	05				6,112		6,112	U
147	0303032A	TROJAN - RH12	05				5,631		5,631	U
148	0303267A	Auctioned Spectrum Relocation Fund	05							U
149	0303367A	Spectrum Access Research and Development	05							U
150	0304270A	Electronic Warfare Development	05				14,616		14,616	U
151	1205117A	Tractor Bears	05				17,928		17,928	U
		System Development & Demonstration					3,070,680		3,070,680	
152	0604256A	Threat Simulator Development	06				22,862		22,862	U
153	0604258A	Target Systems Development	06				13,902		13,902	U
154	0604759A	Major T&E Investment	06				102,901		102,901	U
155	0605103A	Rand Arroyo Center	06				20,140		20,140	U

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140	0605380A	AMF Joint Tactical Radio System (JTRS)	05	15,984		15,984	U
141	0605450A	Joint Air-to-Ground Missile (JAGM)	05	11,773		11,773	U
142	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	277,607		277,607	U
143	0605766A	National Capabilities Integration (MIP)	05	12,340		12,340	U
144	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	2,686		2,686	U
145	0605830A	Aviation Ground Support Equipment	05	2,706		2,706	U
146	0210609A	Paladin Integrated Management (PIM)	05				U
147	0303032A	TROJAN - RH12	05	4,521	1,200	5,721	U
148	0303267A	Auctioned Spectrum Relocation Fund	05				U
149	0303367A	Spectrum Access Research and Development	05				U
150	0304270A	Electronic Warfare Development	05	8,922		8,922	U
151	1205117A	Tractor Bears	05	23,170		23,170	U
		System Development & Demonstration		3,192,689	236,863	3,429,552	
152	0604256A	Threat Simulator Development	06	12,835		12,835	U
153	0604258A	Target Systems Development	06	12,135		12,135	U
154	0604759A	Major T&E Investment	06	82,996		82,996	U
155	0605103A	Rand Arroyo Center	06	19,821		19,821	U

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156	0605301A	Army Kwajalein Atoll	06	219,271	246,663	246,663			U
157	0605326A	Concepts Experimentation Program	06	24,668	29,820	29,820			U
158	0605502A	Small Business Innovative Research	06	230,691					U
159	0605601A	Army Test Ranges and Facilities	06	305,238	307,588	307,588			U
160	0605602A	Army Technical Test Instrumentation and Targets	06	70,523	49,242	49,242			U
161	0605604A	Survivability/Lethality Analysis	06	38,245	41,843	41,843			U
162	0605606A	Aircraft Certification	06	4,486	4,804	4,804			U
163	0605702A	Meteorological Support to RDT&E Activities	06	6,793	7,238	7,238			U
164	0605706A	Materiel Systems Analysis	06	21,510	21,890	21,890			U
165	0605709A	Exploitation of Foreign Items	06	12,415	12,684	12,684			U
166	0605712A	Support of Operational Testing	06	49,580	51,040	51,040			U
167	0605716A	Army Evaluation Center	06	55,460	56,246	56,246			U
168	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	7,653	1,829	1,829			U
169	0605801A	Programwide Activities	06	50,971	55,060	55,060			U
170	0605803A	Technical Information Activities	06	29,905	33,934	33,934			U
171	0605805A	Munitions Standardization, Effectiveness and Safety	06	63,983	43,444	43,444			U
172	0605857A	Environmental Quality Technology Mgmt Support	06	2,048	5,087	5,087			U

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156	0605301A	Army Kwajalein Atoll	06				246,663		246,663	U
157	0605326A	Concepts Experimentation Program	06				29,820		29,820	U
158	0605502A	Small Business Innovative Research	06							U
159	0605601A	Army Test Ranges and Facilities	06				307,588		307,588	U
160	0605602A	Army Technical Test Instrumentation and Targets	06				49,242		49,242	U
161	0605604A	Survivability/Lethality Analysis	06				41,843		41,843	U
162	0605606A	Aircraft Certification	06				4,804		4,804	U
163	0605702A	Meteorological Support to RDT&E Activities	06				7,238		7,238	U
164	0605706A	Materiel Systems Analysis	06				21,890		21,890	U
165	0605709A	Exploitation of Foreign Items	06				12,684		12,684	U
166	0605712A	Support of Operational Testing	06				51,040		51,040	U
167	0605716A	Army Evaluation Center	06				56,246		56,246	U
168	0605718A	Army Modeling & Sim X-Command Collaboration & Integ	06				1,829		1,829	U
169	0605801A	Programwide Activities	06				55,060		55,060	U
170	0605803A	Technical Information Activities	06				33,934		33,934	U
171	0605805A	Munitions Standardization, Effectiveness and Safety	06				43,444		43,444	U
172	0605857A	Environmental Quality Technology Mgmt Support	06				5,087		5,087	U

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156	0605301A	Army Kwajalein Atoll	06	246,574		246,574	U
157	0605326A	Concepts Experimentation Program	06	30,430		30,430	U
158	0605502A	Small Business Innovative Research	06				U
159	0605601A	Army Test Ranges and Facilities	06	305,759		305,759	U
160	0605602A	Army Technical Test Instrumentation and Targets	06	62,379		62,379	U
161	0605604A	Survivability/Lethality Analysis	06	40,496		40,496	U
162	0605606A	Aircraft Certification	06	3,941		3,941	U
163	0605702A	Meteorological Support to RDT&E Activities	06	9,767		9,767	U
164	0605706A	Materiel Systems Analysis	06	21,226		21,226	U
165	0605709A	Exploitation of Foreign Items	06	13,026		13,026	U
166	0605712A	Support of Operational Testing	06	52,718		52,718	U
167	0605716A	Army Evaluation Center	06	57,049		57,049	U
168	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	2,801		2,801	U
169	0605801A	Programwide Activities	06	60,942		60,942	U
170	0605803A	Technical Information Activities	06	29,050		29,050	U
171	0605805A	Munitions Standardization, Effectiveness and Safety	06	42,332		42,332	U
172	0605857A	Environmental Quality Technology Mgmt Support	06	3,216		3,216	U

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173	0605898A	Army Direct Report Headquarters - R&D - MHA	06	49,287	54,679	54,679			U
174	0606001A	Military Ground-Based CREW Technology	06		7,916	7,916			U
175	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06		61,254	61,254			U
176	0606003A	CounterIntel and Human Intel Modernization	06						U
177	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06						U
178	0303260A	Defense Military Deception Initiative	06	1,923	1,779	1,779			U
179	0909980A	Judgment Fund Reimbursement	06	7,893					U
180	0909999A	Financing for Cancelled Account Adjustments	06	6					U
		RDT&E Management Support		1,413,481	1,253,845	1,253,845			
181	0603778A	MLRS Product Improvement Program	07	34,391	8,929	8,929			U
182	0603813A	TRACTOR PULL	07	3,960	4,014	4,014			U
183	0605024A	Anti-Tamper Technology Support	07	3,498	4,094	4,094			U
184	0607131A	Weapons and Munitions Product Improvement Programs	07	19,969	15,738	15,738			U
185	0607133A	TRACTOR SMOKE	07	4,479	4,513	4,513			U
186	0607134A	Long Range Precision Fires (LRPF)	07	36,322	102,014	102,014			U
187	0607135A	Apache Product Improvement Program	07	60,995	59,977	59,977			U

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173	0605898A	Army Direct Report Headquarters - R&D - MHA	06				54,679		54,679	U
174	0606001A	Military Ground-Based CREW Technology	06				7,916		7,916	U
175	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06				61,254		61,254	U
176	0606003A	CounterIntel and Human Intel Modernization	06							U
177	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06							U
178	0303260A	Defense Military Deception Initiative	06				1,779		1,779	U
179	0909980A	Judgment Fund Reimbursement	06							U
180	0909999A	Financing for Cancelled Account Adjustments	06							U
		RDT&E Management Support					1,253,845		1,253,845	
181	0603778A	MLRS Product Improvement Program	07				8,929		8,929	U
182	0603813A	TRACTOR PULL	07				4,014		4,014	U
183	0605024A	Anti-Tamper Technology Support	07				4,094		4,094	U
184	0607131A	Weapons and Munitions Product Improvement Programs	07				15,738		15,738	U
185	0607133A	TRACTOR SMOKE	07				4,513		4,513	U
186	0607134A	Long Range Precision Fires (LRPF)	07				102,014		102,014	U
187	0607135A	Apache Product Improvement Program	07				59,977		59,977	U

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173	0605898A	Army Direct Report Headquarters - R&D - MHA	06	54,145		54,145	U
174	0606001A	Military Ground-Based CREW Technology	06	4,896		4,896	U
175	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	63,011		63,011	U
176	0606003A	CounterIntel and Human Intel Modernization	06	2,636		2,636	U
177	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	88,300		88,300	U
178	0303260A	Defense Military Deception Initiative	06				U
179	0909980A	Judgment Fund Reimbursement	06				U
180	0909999A	Financing for Cancelled Account Adjustments	06				U
		RDT&E Management Support		1,322,481		1,322,481	
181	0603778A	MLRS Product Improvement Program	07	8,886		8,886	U
182	0603813A	TRACTOR PULL	07	4,067		4,067	U
183	0605024A	Anti-Tamper Technology Support	07	4,254		4,254	U
184	0607131A	Weapons and Munitions Product Improvement Programs	07	16,022	2,548	18,570	U
185	0607133A	TRACTOR SMOKE	07	4,577	7,780	12,357	U
186	0607134A	Long Range Precision Fires (LRPF)	07	186,475		186,475	U
187	0607135A	Apache Product Improvement Program	07	31,049		31,049	U

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188	0607136A	Blackhawk Product Improvement Program	07	44,966	34,416	34,416			U
189	0607137A	Chinook Product Improvement Program	07	88,314	194,567	194,567			U
190	0607138A	Fixed Wing Product Improvement Program	07	765	9,981	9,981			U
191	0607139A	Improved Turbine Engine Program	07	111,638	204,304	204,304			U
192	0607140A	Emerging Technologies from NIE	07	2,278	1,023	1,023			U
193	0607141A	Logistics Automation	07	1,542	1,504	1,504			U
194	0607142A	Aviation Rocket System Product Improvement and Development	07		10,064	10,064			U
195	0607143A	Unmanned Aircraft System Universal Products	07		38,463	38,463			U
196	0607665A	Family of Biometrics	07	11,632	6,159	6,159			U
197	0607865A	Patriot Product Improvement	07	48,073	90,217	90,217			U
198	0202429A	Aerostat Joint Project - COCOM Exercise	07	6,178	6,749	6,749			U
199	0203728A	Joint Automated Deep Operation Coordination System (JADOCs)	07	29,412	33,520	33,520			U
200	0203735A	Combat Vehicle Improvement Programs	07	340,353	343,175	343,175			U
201	0203740A	Maneuver Control System	07	3,943	6,639	6,639			U
202	0203743A	155mm Self-Propelled Howitzer Improvements	07		40,784	40,784			U
203	0203744A	Aircraft Modifications/Product Improvement Programs	07	32,397	39,358	39,358			U

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188	0607136A	Blackhawk Product Improvement Program	07				34,416		34,416	U
189	0607137A	Chinook Product Improvement Program	07				194,567		194,567	U
190	0607138A	Fixed Wing Product Improvement Program	07				9,981		9,981	U
191	0607139A	Improved Turbine Engine Program	07				204,304		204,304	U
192	0607140A	Emerging Technologies from NIE	07				1,023		1,023	U
193	0607141A	Logistics Automation	07				1,504		1,504	U
194	0607142A	Aviation Rocket System Product Improvement and Development	07				10,064		10,064	U
195	0607143A	Unmanned Aircraft System Universal Products	07				38,463		38,463	U
196	0607665A	Family of Biometrics	07				6,159		6,159	U
197	0607865A	Patriot Product Improvement	07				90,217		90,217	U
198	0202429A	Aerostat Joint Project - COCOM Exercise	07				6,749		6,749	U
199	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07				33,520		33,520	U
200	0203735A	Combat Vehicle Improvement Programs	07				343,175		343,175	U
201	0203740A	Maneuver Control System	07				6,639		6,639	U
202	0203743A	155mm Self-Propelled Howitzer Improvements	07				40,784		40,784	U
203	0203744A	Aircraft Modifications/Product Improvement Programs	07				39,358		39,358	U

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188	0607136A	Blackhawk Product Improvement Program	07	35,240		35,240	U
189	0607137A	Chinook Product Improvement Program	07	157,822		157,822	U
190	0607138A	Fixed Wing Product Improvement Program	07	4,189		4,189	U
191	0607139A	Improved Turbine Engine Program	07	192,637		192,637	U
192	0607140A	Emerging Technologies from NIE	07				U
193	0607141A	Logistics Automation	07				U
194	0607142A	Aviation Rocket System Product Improvement and Development	07	60,860		60,860	U
195	0607143A	Unmanned Aircraft System Universal Products	07	52,019		52,019	U
196	0607665A	Family of Biometrics	07	2,400		2,400	U
197	0607865A	Patriot Product Improvement	07	65,369		65,369	U
198	0202429A	Aerostat Joint Project - COCOM Exercise	07	1		1	U
199	0203728A	Joint Automated Deep Operation Coordination System (JADOCs)	07	30,954		30,954	U
200	0203735A	Combat Vehicle Improvement Programs	07	411,927		411,927	U
201	0203740A	Maneuver Control System	07				U
202	0203743A	155mm Self-Propelled Howitzer Improvements	07	40,676		40,676	U
203	0203744A	Aircraft Modifications/Product Improvement Programs	07	17,706		17,706	U

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204	0203752A	Aircraft Engine Component Improvement Program	07	249	145	145			U
205	0203758A	Digitization	07	6,234	4,803	4,803			U
206	0203801A	Missile/Air Defense Product Improvement Program	07	24,925	2,723	2,723	15,000	15,000	U
207	0203802A	Other Missile Product Improvement Programs	07	8,283	5,000	5,000			U
208	0203808A	TRACTOR CARD	07	20,333	37,883	37,883			U
209	0205402A	Integrated Base Defense - Operational System Dev	07	3,450					U
210	0205410A	Materials Handling Equipment	07	119	1,582	1,582			U
211	0205412A	Environmental Quality Technology - Operational System Dev	07		195	195			U
212	0205456A	Lower Tier Air and Missile Defense (AMD) System	07	61,449	78,926	78,926			U
213	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	21,196	102,807	102,807			U
214	0208053A	Joint Tactical Ground System	07	12,649					U
216	0303028A	Security and Intelligence Activities	07	15,719	13,807	13,807			U
217	0303140A	Information Systems Security Program	07	36,892	132,438	132,438			U
218	0303141A	Global Combat Support System	07	26,176	64,370	64,370			U
219	0303142A	SATCOM Ground Environment (SPACE)	07	18,761					U
220	0303150A	WWMCCS/Global Command and Control System	07	4,536	10,475	10,475			U

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204	0203752A	Aircraft Engine Component Improvement Program	07				145		145	U
205	0203758A	Digitization	07				4,803		4,803	U
206	0203801A	Missile/Air Defense Product Improvement Program	07				17,723		17,723	U
207	0203802A	Other Missile Product Improvement Programs	07				5,000		5,000	U
208	0203808A	TRACTOR CARD	07				37,883		37,883	U
209	0205402A	Integrated Base Defense - Operational System Dev	07							U
210	0205410A	Materials Handling Equipment	07				1,582		1,582	U
211	0205412A	Environmental Quality Technology - Operational System Dev	07				195		195	U
212	0205456A	Lower Tier Air and Missile Defense (AMD) System	07				78,926		78,926	U
213	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07				102,807		102,807	U
214	0208053A	Joint Tactical Ground System	07							U
216	0303028A	Security and Intelligence Activities	07				13,807		13,807	U
217	0303140A	Information Systems Security Program	07				132,438		132,438	U
218	0303141A	Global Combat Support System	07				64,370		64,370	U
219	0303142A	SATCOM Ground Environment (SPACE)	07							U
220	0303150A	WWMCCS/Global Command and Control System	07				10,475		10,475	U

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204	0203752A	Aircraft Engine Component Improvement Program	07	146		146	U
205	0203758A	Digitization	07	6,316		6,316	U
206	0203801A	Missile/Air Defense Product Improvement Program	07	1,643	2,000	3,643	U
207	0203802A	Other Missile Product Improvement Programs	07	4,947		4,947	U
208	0203808A	TRACTOR CARD	07	34,050		34,050	U
209	0205402A	Integrated Base Defense - Operational System Dev	07		8,000	8,000	U
210	0205410A	Materials Handling Equipment	07	1,464		1,464	U
211	0205412A	Environmental Quality Technology - Operational System Dev	07	249		249	U
212	0205456A	Lower Tier Air and Missile Defense (AMD) System	07	79,283		79,283	U
213	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	154,102		154,102	U
214	0208053A	Joint Tactical Ground System	07				U
216	0303028A	Security and Intelligence Activities	07	12,280	23,199	35,479	U
217	0303140A	Information Systems Security Program	07	68,533		68,533	U
218	0303141A	Global Combat Support System	07	68,619		68,619	U
219	0303142A	SATCOM Ground Environment (SPACE)	07				U
220	0303150A	WWMCCS/Global Command and Control System	07	2,034		2,034	U

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223	0305172A	Combined Advanced Applications	07		1,100	1,100			U
224	0305179A	Integrated Broadcast Service (IBS)	07						U
225	0305204A	Tactical Unmanned Aerial Vehicles	07	8,218	9,433	9,433	7,492	7,492	U
226	0305206A	Airborne Reconnaissance Systems	07	11,799	5,080	5,080	15,000	15,000	U
227	0305208A	Distributed Common Ground/Surface Systems	07	32,284	24,700	24,700			U
228	0305219A	MQ-1C Gray Eagle UAS	07	13,470	9,574	9,574			U
229	0305232A	RQ-11 UAV	07	1,613	2,191	2,191			U
230	0305233A	RQ-7 UAV	07	4,597	12,773	12,773			U
231	0307665A	Biometrics Enabled Intelligence	07	8,854	2,537	2,537	6,036	6,036	U
232	0310349A	Win-T Increment 2 - Initial Networking	07	4,680	4,723	4,723			U
233	0708045A	End Item Industrial Preparedness Activities	07	59,891	60,877	60,877			U
234	1203142A	SATCOM Ground Environment (SPACE)	07		11,959	11,959			U
235	1208053A	Joint Tactical Ground System	07		10,228	10,228			U
9999	9999999999	Classified Programs		4,625	7,154	7,154			U
		Operational Systems Development		1,296,107	1,877,685	1,877,685	43,528	43,528	
236	0901560A	Continuing Resolution Programs	20		-1,151,993	-1,151,993	222,988	222,988	U
		Undistributed			-1,151,993	-1,151,993	222,988	222,988	
Total Research, Development, Test & Eval, Army				8,852,507	8,273,447	8,273,447	342,356	342,356	

R-119PB: FY 2019 President's Budget (Published Version), as of January 18, 2018 at 15:06:20

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Department of the Army
 FY 2019 President's Budget
 Exhibit R-1 FY 2019 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

18 Jan 2018

Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2018 Emergency Requests**	FY 2018 Less Enacted Div B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req Emergency	FY 2018 Total PB Requests* with CR Adj Base + OCO + Emergency**	FY 2018 Less Enacted DIV B P.L.115-96*** MDDE + Ship Repairs	FY 2018 Remaining Req with CR Adj Base + OCO + Emergency	S
223	0305172A	Combined Advanced Applications	07				1,100		1,100	U
224	0305179A	Integrated Broadcast Service (IBS)	07							U
225	0305204A	Tactical Unmanned Aerial Vehicles	07				16,925		16,925	U
226	0305206A	Airborne Reconnaissance Systems	07				20,080		20,080	U
227	0305208A	Distributed Common Ground/Surface Systems	07				24,700		24,700	U
228	0305219A	MQ-1C Gray Eagle UAS	07				9,574		9,574	U
229	0305232A	RQ-11 UAV	07				2,191		2,191	U
230	0305233A	RQ-7 UAV	07				12,773		12,773	U
231	0307665A	Biometrics Enabled Intelligence	07				8,573		8,573	U
232	0310349A	Win-T Increment 2 - Initial Networking	07				4,723		4,723	U
233	0708045A	End Item Industrial Preparedness Activities	07				60,877		60,877	U
234	1203142A	SATCOM Ground Environment (SPACE)	07				11,959		11,959	U
235	1208053A	Joint Tactical Ground System	07				10,228		10,228	U
9999	9999999999	Classified Programs					7,154		7,154	U
		Operational Systems Development					1,921,213		1,921,213	
236	0901560A	Continuing Resolution Programs	20				-929,005		-929,005	U
		Undistributed					-929,005		-929,005	
Total Research, Development, Test & Eval, Army				20,700	-20,700		8,636,503	-20,700	8,615,803	

R-119PB: FY 2019 President's Budget (Published Version), as of January 18, 2018 at 15:06:20

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Department of the Army
 FY 2019 President's Budget
 Exhibit R-1 FY 2019 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

18 Jan 2018

Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Se
223	0305172A	Combined Advanced Applications	07	1,500		1,500	U
224	0305179A	Integrated Broadcast Service (IBS)	07	450		450	U
225	0305204A	Tactical Unmanned Aerial Vehicles	07	6,000		6,000	U
226	0305206A	Airborne Reconnaissance Systems	07	12,416	14,000	26,416	U
227	0305208A	Distributed Common Ground/Surface Systems	07	38,667		38,667	U
228	0305219A	MQ-1C Gray Eagle UAS	07				U
229	0305232A	RQ-11 UAV	07	6,180		6,180	U
230	0305233A	RQ-7 UAV	07	12,863		12,863	U
231	0307665A	Biometrics Enabled Intelligence	07	4,310	2,214	6,524	U
232	0310349A	Win-T Increment 2 - Initial Networking	07				U
233	0708045A	End Item Industrial Preparedness Activities	07	53,958		53,958	U
234	1203142A	SATCOM Ground Environment (SPACE)	07	12,119		12,119	U
235	1208053A	Joint Tactical Ground System	07	7,400		7,400	U
9999	9999999999	Classified Programs		5,955		5,955	U
		Operational Systems Development		1,922,614	59,741	1,982,355	
236	0901560A	Continuing Resolution Programs	20				U
		Undistributed					
Total Research, Development, Test & Eval, Army				10,159,379	325,104	10,484,483	

R-119PB: FY 2019 President's Budget (Published Version), as of January 18, 2018 at 15:06:20

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Army • Budget Estimates FY 2019 • RDT&E Program

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Appropriation 2040: Research, Development, Test & Evaluation, Army

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54	04	0603305A	Army Missile Defense Sys Integration - Non Space.....	1
55	04	0603308A	Army Space Systems Integration.....	17
56	04	0603327A	Air and Missile Defense Systems Engineering.....	27
57	04	0603619A	Close Combat Systems Adv Dev.....	36
58	04	0603627A	Smoke, Obscurity and Target Defeating Sys AD.....	54
59	04	0603639A	Weapons and Munitions - Advanced Development.....	66
60	04	0603645A	Armored Systems Modernization Adv Dev.....	158
61	04	0603747A	Soldier Support and Survivability.....	168
62	04	0603766A	Tactical Support Development - Adv Dev (MIP).....	200
63	04	0603774A	Night Vision System Advanced Development.....	210
64	04	0603779A	Environmental Quality Technology Dem/Val.....	220
65	04	0603790A	NATO RESEARCH AND DEVELOPMENT.....	236
66	04	0603801A	Aviation Advanced Development.....	248
67	04	0603804A	Logistics and Engineer Equipment Adv Dev.....	257
68	04	0603807A	Medical Systems Advanced Development.....	304
69	04	0603827A	Soldier Systems - Advanced Development.....	341

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Appropriation 2040: Research, Development, Test & Evaluation, Army

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71	04	0604020A	CFT Advanced Development & Prototyping.....	404
72	04	0604100A	Analysis Of Alternatives.....	411
73	04	0604113A	Future Tactical Unmanned Aircraft System (FTUAS).....	417
74	04	0604114A	Lower Tier Missile Defense (LTAMD) Capability.....	424
75	04	0604115A	Technology Maturation Initiatives.....	433
76	04	0604117A	Short Range Air Defense (M-SHORAD).....	449
77	04	0604118A	TRACTOR BEAM.....	458
78	04	0604120A	Assured Positioning, Navigation and Timing (PNT).....	459
79	04	0604121A	Synthetic Training Environment Refine & Prototype.....	496
80	04	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2).....	503
81	04	0305251A	Cyberspace Operations Forces and Force Support.....	514
82	04	1206120A	ASSURED POSITIONING, NAVIGATION AND TIMING (PNT).....	523
83	04	1206308A	Army Missile Defense Systems Integration.....	558

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Program Element Table of Contents (Alphabetically by Program Element Title)

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Air and Missile Defense Systems Engineering	0603327A	56	04.....	27
Analysis Of Alternatives	0604100A	72	04.....	411
Armored Systems Modernization Adv Dev	0603645A	60	04.....	158
Army Missile Defense Sys Integration - Non Space	0603305A	54	04.....	1
Army Missile Defense Systems Integration	1206308A	83	04.....	558
Army Space Systems Integration	0603308A	55	04.....	17
Assured Positioning, Navigation and Timing (PNT)	0604120A	78	04.....	459
Aviation Advanced Development	0603801A	66	04.....	248
CFT Advanced Development & Prototyping	0604020A	71	04.....	404
Close Combat Systems Adv Dev	0603619A	57	04.....	36
Cyberspace Operations Forces and Force Support	0305251A	81	04.....	514
Environmental Quality Technology Dem/Val	0603779A	64	04.....	220
Future Tactical Unmanned Aircraft System (FTUAS)	0604113A	73	04.....	417
Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	0604319A	80	04.....	503
Logistics and Engineer Equipment Adv Dev	0603804A	67	04.....	257
Lower Tier Missile Defense (LTAMD) Capability	0604114A	74	04.....	424

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NATO RESEARCH AND DEVELOPMENT	0603790A	65	04.....	236
Night Vision System Advanced Development	0603774A	63	04.....	210
Robotics Development	0604017A	70	04.....	375
Short Range Air Defense (M-SHORAD)	0604117A	76	04.....	449
Smoke, Obscurity and Target Defeating Sys AD	0603627A	58	04.....	54
Soldier Support and Survivability	0603747A	61	04.....	168
Soldier Systems - Advanced Development	0603827A	69	04.....	341
Synthetic Training Environment Refine & Prototype	0604121A	79	04.....	496
TRACTOR BEAM	0604118A	77	04.....	458
Tactical Support Development - Adv Dev (MIP)	0603766A	62	04.....	200
Technology Maturation Initiatives	0604115A	75	04.....	433
Weapons and Munitions - Advanced Development	0603639A	59	04.....	66

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FY 2019 RDT&E, ARMY PROGRAM ELEMENT
DESCRIPTIVE SUMMARIES

Introduction and Explanation of Contents

1. **General.** The purpose of this document is to provide summary information concerning the Research, Development, Test and Evaluation, Army program. The descriptive summaries are comprised of R-2 (Army RDT&E Budget Item Justification – program element level), R-2A (Army RDT&E Budget Item Justification – project level), R-3 (Army RDT&E Cost Analysis), R-4 (Schedule Profile Detail) and R-5 (Termination Liability Funding for MDAPs) Exhibits, which provide narrative information on all RDT&E program elements and projects through FY 2019.

2. **Relationship of the FY 2019 Budget Submitted to Congress to the FY 2018 Budget Submitted to Congress.** This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

A. New Start Programs:

Budget Activity	OSDPE / Project	Project Title
02	0602126A / XW8	TRACTOR JACK
02	0602787A / XV5	Medical Capabilities to Support Dispersed Ops
04	0604020A / CF1	CFT Advanced Development & Prototyping
04	0604113A / EX8	Future Tactical Unmanned Aircraft System (FTUAS)
06	0605898A / FJ2	Army SHARP RDTE
06	0606942A / FL2	Cyber Vulnerabilities Assessments and Evaluations
07	0305179A / EF4	Integrated Broadcast System
07	0305206A / EH7	Guardrail Common Sensor (GRCS) Payloads (MIP)
07	0305206A / EH2	EMARSS ADV DEV (MIP)

B. Program Element/Project Restructures:

Budget Activity	Old OSDPE / Project: Title	New OSDPE / Project: Title
02	0602105A / H84: Materials	0602105A / XW4: Manufacturing Science
02	0602270A / 906: Tactical Electronic Warfare Applied Research	0602270A / CYB: Applied Offensive Cyber
02	0602782A / 779: Command, Control And Platform Electronics Tech	0602782A / CY2: Applied Defensive Cyber
02	0602782A / H92: Communications Technology	0602782A / CY2: Applied Defensive Cyber
02	0602786A / 283: Airdrop Adv Tech	0602786A / XW5: Small Unit Expeditionary Maneuver Technology
02	0602786A / H99: Joint Service Combat Feeding Technology	0602786A / XW5: Small Unit Expeditionary Maneuver Technology
02	0602786A / VT4: Expeditionary Mobile Base Camp Technology	0602786A / XW5: Small Unit Expeditionary Maneuver Technology
03	0603001A / C07: Joint Service Combat Feeding Tech Demo	0603001A / XW6: Small Unit Expeditionary Maneuver
03	0603001A / VT5: Expeditionary Mobile Base Camp Demonstration	0603001A / XW6: Small Unit Expeditionary Maneuver
03	0603001A / 242: Airdrop Equipment	0603001A / XW6: Small Unit Expeditionary Maneuver
03	0603270A / K15: Advanced Comm Ecm Demo	0603270A / CY3: Offensive Cyber Demonstration
03	0603270A / K16: Non-Commo Ecm Tech Dem	0603270A / CY3: Offensive Cyber Demonstration
04	0603639A / EL7: Reduced Range Ammunition	0604802A / EP3: Reduced Range Ammunition - Small Caliber
04	0603639A / EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	0607131A / ER6: Direct Fire Technology
04	0603639A / EU1: Enhanced Lethality Cannon Munitions	0604802A / EU7: Enhanced Lethality Cannon Munitions
04	0603639A / EU1: Enhanced Lethality Cannon Munitions	0604802A / EU6: 155mm HE Rocket Assist Project Extended Range
04	0604120A / ED5: Assured Positioning, Navigation and Timing (PNT)	1206120A / FJ8: Assured Positioning, Navigation and Timing (PNT)
04	0604120A / EH8: DISMOUNTED	1206120A / FJ9: Dismounted A-PNT
04	0604120A / EH9: PSEUDOLITES	1206120A / FK1: Pseudolites
04	0604120A / EJ2: MOUNTED	1206120A / FK2: Mounted A-PNT
04	0604120A / EJ3: ANTI-JAM ANTENNA	1206120A / FK3: Anti-Jam Antenna
05	0210609A / ED8: Paladin Integrated Management (PIM)	0203743A / FF9: PIM Improvement Program
05	0604798A / FG7: Emerging Technology Initiatives	0604798A / FI3: Rapid Capability Development and Maturation
05	0604827A / S65: Platoon Power Generator	0604827A / EY3: Soldier Power Generator
05	0605053A / FB4: Common Robotic Systems	0605053A / FG8: Common Robotic Controller
07	0303028A / FG2: Counterintelligence & Human Intel Modernization	0606003A / FI9: Counterl Intel and Human Intel Modernization
07	0205402A / EF2: Integrated Base Defense	0605029A / EQ2: IntegGrdSecSurvRespC(IGSSR-C)
07	0205402A / EF2: Integrated Base Defense	0605033A / EQ3: Grnd-Based Opnl Surv Sys -Exped (GBOSS-E)
07	0303142A / 253: Dscs-Dcs (Phase II)	1203142A / FE1: Dscs-Dcs (Phase II)
07	0303142A / 456: MILSATCOM System Engineering	1203142A / FE2: MILSATCOM System Engineering
07	0303142A / EK8: Enroute Mission Command	1203142A / FE4: Enroute Mission Command

C. Program Terminations:

<u>Budget Activity</u>	<u>OSDPE / Project</u>	<u>OSDPE Title / Project Title</u>
01	0601103A / V72	University Research Initiatives / Minerva; project ends
01	0601104A / H50	University and Industry Research Centers / Network Sciences Cta; project ends
01	0601104A / H53	University and Industry Research Centers / Army High Performance Computing Research Center; project ends
01	0601104A / H54	University and Industry Research Centers / Micro-Autonomous Systems Technology (MAST) CTA; project ends
02	0602105A / H7G	Materials Technology / Nanomaterials Applied Research; project ends
02	0602120A / SA2	Sensors and Electronic Survivability / Biotechnology Applied Research; project ends
02	0602705A / H17	Electronics and Electronic Devices / Flexible Display Center; project ends
02	0602720A / 895	Environmental Quality Technology / Pollution Prevention; project ends
03	0603001A / 543	Warfighter Advanced Technology / Ammunition Logistics; project ends
03	0603015A / S28	Next Generation Training & Simulation Systems / Immersive Learning Environments; project ends
03	0603020A / DB1	TRACTOR ROSE / DDB1; project ends
03	0603606A / 683	Landmine Warfare and Barrier Advanced Technology / Area Denial Sensors; project ends
03	0603728A / 025	Environmental Quality Technology Demonstrations / Pollution Prevention Technology; project ends
04	0604115A / EX3	Technology Maturation Initiatives / Ground Vehicle Prototyping; project ends
05	0604290A / DW1	Mid-tier Networking Vehicular Radio (MNVR) / Mid-Tier Wideband Networking Vehicular Radio Mnv; project ends
05	0604321A / B41	All Source Analysis System / CI/HUMINT Software Products (MIP); project ends
05	0604321A / B51	All Source Analysis System / Machine - Foreign Language Translation System; project ends
05	0604818A / 334	Army Tactical Command & Control Hardware & Software / Common Software; project ends
06	0303260A / FA9	Defense Military Deception Initiative / Security Initiatives; project ends
06	0604759A / FA4	Major T&E Investment / Warrior Injury Assessment Manikin (WIAMan); transitions to procurement
07	0202429A / EP8	Aerostat Joint Project - COCOM Exercise / COCOM Exercise; project ends
07	0203740A / 484	Maneuver Control System / Maneuver Control System; project ends
07	0303142A / EA3	SATCOM Ground Environment (SPACE) / Transportable Tactical Cmd Comms (T2C2); transitions to procurement
07	0303150A / EA5	WWMCCS/Global Command and Control System / Strategic and Joint Mission Command; transitions to procurement
07	0305219A / MQ1	MQ-1 Gray Eagle UAV / MQ-1 Gray Eagle - Army UAV (MIP); project ends
07	0607140A / ES7	Emerging Technologies from NIE / Emerging Technologies from NIE; project ends
07	0607141A / DY1	Logistics Automation / Logistics Information Warehouse (LIW); project ends

- 3. Classification:** This document contains no classified data. Appropriately cleared individuals can obtain further information on Classified/Special Access Programs by contacting the Department of the Army (ASA(ALT)) Special Programs Office.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603305A / <i>Army Missile Defense Sys Integration - Non Space</i>
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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	-	39.395	9.634	10.777	-	10.777	11.936	12.040	12.547	12.697	0.000	109.026
FG6: <i>Missile Defense (CA)</i>	-	30.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.000
TR5: <i>Missile Defense Battlelab</i>	-	9.395	9.634	10.777	-	10.777	11.936	12.040	12.547	12.697	0.000	79.026

A. Mission Description and Budget Item Justification

This Program Element funds missile defense systems integration efforts for both the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT).

USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space and ground-based midcourse defense (GMD), the Army integrator for global missile defense, and the Army Service Component Command (ASCC) of the U.S. Strategic Command (USSTRATCOM). Army Regulation (AR) 10-87 Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007 and AR 5-22 The Army Force Modernization Proponent System dated 19 August 2009 designates USASMDC/ARSTRAT as the Army specified proponent for Global Missile Defense and Space/High Altitude capabilities. As the Army proponent for space, high altitude and GMD, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize the GMD capabilities. As the Army integrator for global missile defense, USASMDC/ARSTRAT is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM to execute its global missile defense responsibilities.

Project TR5 funds United States Army Space and Missile Defense Command/ Army Strategic Command (USASMDC/ARSTRAT) efforts to develop the associated operational prototyping, experimentation, operational analysis, and modeling and simulation in support of current and future Forces.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603305A / <i>Army Missile Defense Sys Integration - Non Space</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	9.433	9.634	11.046	-	11.046
Current President's Budget	39.395	9.634	10.777	-	10.777
Total Adjustments	29.962	0.000	-0.269	-	-0.269
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	30.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.038	-			
• Adjustments to Budget Years	-	-	-0.269	-	-0.269

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: FG6: *Missile Defense (CA)*

Congressional Add: *Enhanced Thermal Management Prototype*

	FY 2017	FY 2018
	30.000	-
Congressional Add Subtotals for Project: FG6	30.000	-
Congressional Add Totals for all Projects	30.000	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Sys Integration - Non Space	Project (Number/Name) FG6 / Missile Defense (CA)
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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
FG6: <i>Missile Defense (CA)</i>	-	30.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This congressional add is for FY 2017.

A. Mission Description and Budget Item Justification

Four major efforts will be performed with these funds. a) High Power Microwave Lethality Prototype testing, testing and modeling will be performed to ascertain the vulnerabilities of critical electrical circuits and components in order to attack adversary systems, such as unmanned aerial systems, and to protect U.S. assets and infrastructure in use by the Warfighter. b) Advanced Electronic/Environmental Control Unit Thermal Management Prototypes of different sizes will be built and tested to reduce the magnitude of fuel used at forward operating bases consumed by environmental control units to keep major electronic systems cool in austere environments. Prototypes will be used to fully evaluate distributed cooling and legacy approaches. c) Technology Complex Compound Materials for Thermal/Energy Management prototypes will be manufactured and test for suitability in high velocity impacts. The planned compound is Coordinative Molecular Bond Armor Material and has potential to provide ballistics and thermal protection. d) Upgrades are planned for the Advanced Measurement Optical Range facility to support laser radar development and testing.

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

	FY 2017	FY 2018
Congressional Add: Enhanced Thermal Management Prototype	30.000	-
FY 2017 Accomplishments: N/A		
Congressional Adds Subtotals	30.000	-

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Sys Integration - Non Space	Project (Number/Name) FG6 / Missile Defense (CA)
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Management Support	SS/CPFF	Huntsville : Huntsville	-	3.303		-		-		-		-	0.000	3.303	-
Subtotal			-	3.303		-		-		-		-	0.000	3.303	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
High Power Microwave Lethality	SS/CPFF	Radiancance : Huntsville	-	3.900	Dec 2017	-		-		-		-	0.000	3.900	-
Advanced Electronic/ Environmental Control Unit Thermal Management Prototype	SS/CPAF	Radiancance : Huntsville	-	14.000	Aug 2017	-		-		-		-	0.000	14.000	-
Technology Complex Compound Materials for Thermal/Energy Management Prototype	SS/CPFF	Radiancance : huntsville	-	2.250	Dec 2017	-		-		-		-	0.000	2.250	-
Advanced Measurement Optical Range Facility Upgrades	SS/CPFF	Radiancance : Huntsville	-	6.194		-		-		-		-	0.000	6.194	-
Subtotal			-	26.344		-		-		-		-	0.000	26.344	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
High Power Microwave Lethality Prototype	SS/CPFF	Georgia Tech : Georgia	-	0.203		-		-		-		-	0.000	0.203	-
Advanced Meaasurement Optical Range Facility Upgrade	SS/CPFF	Huntsville : Huntsville	-	0.150		-		-		-		-	0.000	0.150	-
Subtotal			-	0.353		-		-		-		-	0.000	0.353	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Sys Integration - Non Space				Project (Number/Name) FG6 / Missile Defense (CA)				
	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	-	30.000	0.000	-	-	-	0.000	30.000	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Sys Integration - Non Space		Project (Number/Name) FG6 / Missile Defense (CA)	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Advanced Measurement Optical Range Facility Upgrades																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / <i>Army Missile Defense Sys Integration - Non Space</i>	Project (Number/Name) FG6 / <i>Missile Defense (CA)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Advanced Measurement Optical Range Facility Upgrades	2	2018	4	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Sys Integration - Non Space				Project (Number/Name) TR5 / Missile Defense Battlelab			
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
TR5: <i>Missile Defense Battlelab</i>	-	9.395	9.634	10.777	-	10.777	11.936	12.040	12.547	12.697	0.000	79.026
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element funds missile defense systems integration efforts for both the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT).

USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space and ground-based midcourse defense (GMD), the Army integrator for global missile defense, and the Army Service Component Command (ASCC) of the U.S. Strategic Command (USSTRATCOM). Army Regulation (AR) 10-87 Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007 and AR 5-22 The Army Force Modernization Proponent System dated 19 August 2009 designates USASMDC/ARSTRAT as the Army specified proponent for Global Missile Defense and Space/High Altitude capabilities. As the Army proponent for space, high altitude and GMD, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize the GMD capabilities. As the Army integrator for global missile defense, USASMDC/ARSTRAT is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM to execute its global missile defense responsibilities.

Project TR5 funds United States Army Space and Missile Defense Command/ Army Strategic Command (USASMDC/ARSTRAT) efforts to develop the associated operational prototyping, experimentation, operational analysis, and modeling and simulation in support of current and future Forces.

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

	FY 2017	FY 2018	FY 2019
Title: Prototypes	5.637	5.776	6.359
Description: Funding is provided for the following efforts			
FY 2018 Plans: Take the lessons learned from the FY 2016 efforts to continue to evaluate new technologies in realistic operating environments. This is accomplished by participating in and providing support to Unified Quest wargames and experiments to analyze and integrate technology to identify the feasibility integration into Army space, missile defense, and high altitude systems. The Space and Missile Defense Command will participate and support biennial rewrites of Army Capstone, Operational and Functional Concepts. Continue to provide operational manager support to STRATCOM, NORTHCOM and SOCOM Joint Technical Capability Demonstrations to ensure Army space, missile defense, and high altitude equities are represented in advanced technology			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / <i>Army Missile Defense Sys Integration - Non Space</i>	Project (Number/Name) TR5 / <i>Missile Defense Battlelab</i>
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2017	FY 2018	FY 2019
<p>developments by demonstrating military utility when applied to military equipment and techniques. Examples include: supporting multi service experiments and capability development of the national-directed Phased Adaptive Approach (PAA) for Ballistic Missile Defense (BMD) as it is applied to each of the regional COCOMs; Developing effective Integrated Missile Defense concepts for Army support to the Phased Adaptive Approach (PAA) being implemented within each regional COCOM. A focus area will be informing the Missile Defeat Integrated Capability Development Working Group with experimentation on improving the timeliness and effectiveness of counter ballistic missile time sensitive targeting. Another project is developing and implementing a training environment for cyber defenders to train on defense of the GMD fire control networks through innovative scenario based training environments. Will support TRADOC proponents with their responsibilities relative to doctrine, organization, training, material, leader development and education, personnel, and facilities plus related matters to continue leveraging space, missile defense, and high altitude proponent input to Joint Capabilities Integration and Development System, Science and Technology, Concept Development, Capability Development.</p> <p>FY 2019 Plans: Take the lessons learned from the FY 2018 efforts to continue to evaluate new technologies in realistic operating environments. This is accomplished by participating in and providing support to Unified Quest wargames and experiments to analyze and integrate technology to identify the feasibility integration into Army space, missile defense, and high altitude systems. The Space and Missile Defense Command will participate and support biennial rewrites of Army Capstone, Operational and Functional Concepts. Continue to provide operational manager support to STRATCOM, NORTHCOM and SOCOM Joint Technical Capability Demonstrations to ensure Army missile defense equities are represented in advanced technology developments by demonstrating military utility when applied to military equipment and techniques. Examples include: supporting multi service experiments and capability development of the national-directed Phased Adaptive Approach (PAA) for Ballistic Missile Defense (BMD) as it is applied to each of the regional COCOMs; Developing effective Integrated Missile Defense concepts for Army support to the Phased Adaptive Approach (PAA) being implemented within each regional COCOM. A focus area will be informing the Missile Defeat Integrated Capability Development Working Group with experimentation on improving the timeliness and effectiveness of counter ballistic missile time sensitive targeting. Another project is developing and implementing a training environment for cyber defenders to train on defense of the GMD fire control networks through innovative scenario based training environments. Continue to support TRADOC proponents with their responsibilities relative to doctrine, organization, training, material, leader development and education, personnel, and facilities (DOTMLPF-P) plus related matters to continue missile defense proponent input to Joint Capabilities Integration and Development System (JCIDS), Science and Technology, Concept Development, and Capability Development.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Increased emphasis on evaluating new missile defense technologies in response to increased international ballistic missile threat.</p>			
Title: Analysis, and Models and Simulations (M&S)	3.758	3.858	4.418

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Sys Integration - Non Space	Project (Number/Name) TR5 / Missile Defense Battlelab

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

Description: Funding is provided for the following efforts

FY 2018 Plans:

Support Total Army Analysis (TAA) 20-24 Resourcing Phase. TAA is a phased force structure analysis process that defines the required Army force structure within end strength and accounts for the military and DA Civilian requirements and authorizations necessary to comply with DOD guidance. The TAA provides the basis for the Army's Program Objective Memorandum (POM) development and establishment of the POM Force. Resourcing and Approval, the determination must be made as to the level of acceptable risk to be taken for each capability. These capability demands are based on Army leadership directives, written guidance, risk analysis, the Army force generation approach and input from the Combatant Commander's Daily Operational Requirements (CCDOR). TAA builds a POM Force with which the PEGs can develop their portion of the Army's budget. The POM Force will also determine the OF enabler support force structure and define the Generating Force (GF) necessary to support and sustain the OF capabilities directed in strategic guidance. The determination of the composition of the Army force structure, or shape, is an iterative, risk-benefit, trade-off analysis process. Capability Demand Analysis is made up of two separate events: force guidance and quantitative analysis.

Participate in the Army's FDU process The FDU Includes capabilities development, capabilities determination, requirements approval, and implementation decisions. Develops organizational design solutions to overcome identified capability shortfalls that cannot be accommodated by doctrine, training, leadership and education, facility, or policy solutions. As part of the solution development, TRADOC CoEs force modernization proponents and non-TRADOC force management proponents consider courses of action across DOTMLPF-P with the intent of deriving materiel, personnel and organizational solutions as a last resort. Once an organizational solution becomes the recommendation, the force modernization proponent begins the integration process across the DOTMLPF-P domains.

Take the lessons learned from the FY 2017 efforts to continue to evaluate new technologies in realistic operating environments. This will be accomplished by supporting ongoing efforts that provide the most realistic operating environment available to perform technology gap and cost reduction analysis of space, missile defense, and high altitude systems. Realistic operating environments will be available to determine the ability of the specific technologies to fill capability gaps in terms of utility to the warfighter. Support of technology demonstrations, Analysis and Demonstration Tools/Test Beds for evolving space superiority, high altitude and operationally responsive space concepts will address emerging needs and continue to be expanded to ensure that advanced technology development can adequately enhance missile defense capabilities. The Future War Center (FWC) will continue to provide program management for maintenance, sustainment, and development for Extended Air Defense Simulation (EADSIM) delivering the required high fidelity synthetic operating environment to provide the capability to perform system and cost benefit analysis, operational planning, and exercise/ experimentation support. The FWC will continue to provide program

FY 2017	FY 2018	FY 2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / <i>Army Missile Defense Sys Integration - Non Space</i>	Project (Number/Name) TR5 / <i>Missile Defense Battlelab</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>management for maintenance, sustainment, and development for Reconfigurable Tactical Operations Simulator (RTOS) delivering operator in the loop capability for air and missile defense simulation in distributed exercises and experiments."</p> <p><i>FY 2019 Plans:</i> Take the lessons learned from the FY 2018 efforts to continue to evaluate new technologies in realistic operating environments. This will be accomplished by supporting ongoing efforts that provide the most realistic operating environment available to perform technology gap and cost reduction analysis of missile defense systems. Realistic operating environments will be available to determine the ability of the specific technologies to fill capability gaps in terms of utility to the warfighter. Support of technology demonstrations, Analysis and Demonstration Tools/Test Beds for evolving missile defense concepts will address emerging needs and continue to be expanded to ensure that advanced technology development can adequately enhance missile defense capabilities. The Future Warfare Center (FWC) will continue to provide program management for maintenance, sustainment, and development for Extended Air Defense Simulation (EADSIM) delivering the required high fidelity synthetic operating environment to provide the capability to perform system and cost benefit analysis, operational planning, and exercise/ experimentation support. The FWC will continue to provide program management for maintenance, sustainment, and development for Reconfigurable Tactical Operations Simulator (RTOS) delivering operator in the loop capability for air and missile defense simulation in distributed exercises and experiments. The FWC will continue to provide program management for maintenance, sustainment, and development for the Joint Embedded Messaging System (JEMS) providing data translation application that enables communications between disparate systems, protocols and architectures.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Marginal increases in funding reflects increased demand to model and simulate realistic operating environments based on increasing ballistic missile defense threats.</p>			
Accomplishments/Planned Programs Subtotals	9.395	9.634	10.777

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks
D. Acquisition Strategy Not applicable for this item.
E. Performance Metrics N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603305A / Army Missile Defense Sys Integration - Non Space				TR5 / Missile Defense Battlelab							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Missile /Defense Battlelab	C/TBD	To Be determined : To be Determined	-	-		-		9.364		-		9.364	0.000	9.364	-
Subtotal			-	-		-		9.364		-		9.364	0.000	9.364	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Contracts	TBD	To Be Determined : To be determined	-	-		1.232		1.413		-		1.413	0.000	2.645	-
Subtotal			-	-		1.232		1.413		-		1.413	0.000	2.645	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Experiments & technology enhancements of prototypes/tools and analysis.	Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	116.853	0.574		-		-		-		-	Continuing	Continuing	Continuing
Govt Support and Support Contracts	Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	121.560	8.821		8.402		-		-		-	Continuing	Continuing	Continuing
Subtotal			238.413	9.395		8.402		-		-		-	Continuing	Continuing	N/A
Project Cost Totals			238.413	9.395		9.634		10.777		-		10.777	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Sys Integration - Non Space	Project (Number/Name) TR5 / Missile Defense Battlelab

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Experiments & technology enhancements of prototypes																												
Development of Extended Air Defense Simulation Updates																												
Reconfigurable Tactical Operations System (RTOS) Development																												
JFCC-Integrated Missile Defense Operational Analysis																												
High Energy Laser for AMD																												
Analysis Support to JIAMD																												
Force Design Assessment of Army Forces																												
AN/TPY-2 FBM Transition from MDA to Army																												
Enhanced Thermal Management Testbed																												
Missile Defense Simulation Suppt to TRADOC ARCIC Experimentation																												
Joint Capabilities Mix Study (JCM4)																												
Force Design Requirements Assessment for Missile Defense Forces																												
Allied and Partner Modeling to Inform Integration Efforts to Meet																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / <i>Army Missile Defense Sys Integration - Non Space</i>	Project (Number/Name) TR5 / <i>Missile Defense Battlelab</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Pacific Focused-Adversary Centric Bundled																												
Inert Debris Analysis																												
Hypersonics Analysis																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / <i>Army Missile Defense Sys Integration - Non Space</i>	Project (Number/Name) TR5 / <i>Missile Defense Battlelab</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Experiments & technology enhancements of prototypes	1	2018	4	2023
Development of Extended Air Defense Simulation Updates	1	2018	4	2023
Reconfigurable Tactical Operations System (RTOS) Development	1	2018	4	2023
JFCC-Integrated Missile Defense Operational Analysis	1	2018	4	2023
High Energy Laser for AMD	1	2015	4	2018
Analysis Support to JIAMDO	1	2018	4	2023
Force Design Assessment of Army Forces	3	2016	3	2017
AN/TPY-2 FBM Transition from MDA to Army	1	2018	4	2023
Enhanced Thermal Management Testbed	1	2015	1	2017
Missile Defense Simulation Suppt to TRADOC ARCIC Experimentation	1	2018	4	2023
Joint Capabilities Mix Study (JCM4)	1	2015	4	2017
Force Design Requirements Assessment for Missile Defense Forces	1	2018	4	2023
Allied and Partner Modeling to Inform Integration Efforts to Meet Objectives	3	2016	4	2018
Pacific Focused-Adversary Centric Bundled	3	2016	4	2018
Inert Debris Analysis	3	2017	2	2018
Hypersonics Analysis	2	2017	4	2018

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603308A / <i>Army Space Systems Integration</i>
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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	-	32.278	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	32.278
990: <i>Space And Missile Defense Integration</i>	-	12.638	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.638
EB7: <i>Army Space System Enhancement/Integration</i>	-	19.640	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.640

Note

- Beginning in FY2018 all project 990 funds will transfer to PE 1206308A, Project FE5.
- Beginning in FY2018 all project EB7 funds transition to PE 1206308A project FE6 and PE 1205117A project FG3.

A. Mission Description and Budget Item Justification

The program element funds space systems integration efforts performed by the US Army Space and Missile Defense Command/ Army Forces Strategic Command (USASMDC/ARSTRAT) and the Program Executive Office for Intelligence, Electronic Warfare (PEO IEW&S).

Project EB7 - PEO IEW&S/USASMDC/ARSTRAT: Details of this program are reported in accordance with Title 10, United States Code, Section 119 (a)(1).

Project 990 funds USASMDC/ARSTRAT to integrate warfighting concepts and technologies, validate concepts, and identify capabilities needed to implement the validated concepts, and develop DOTMLPF solutions to realize those space and high altitude related capabilities. Provide engineering support to the Joint Friendly Force Tracking (J-FFT) Mission Management Center (MMC) through an associated test-bed for both operational and developmental injection and integration of real-time J-FFT information into the Common Operating Picture (COP) for Combatant Commanders (COCOMs), Joint Task Forces (JTFs), and Coalition Partners. The MMC injects real-time J-FFT information into the COP for COCOMs, JTFs and Coalition partners. USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DoD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMDC/ARSTRAT as the lead USSTRATCOM component command for Friendly Force Tracking (FFT).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603308A / <i>Army Space Systems Integration</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	32.431	0.000	0.000	-	0.000
Current President's Budget	32.278	0.000	0.000	-	0.000
Total Adjustments	-0.153	0.000	0.000	-	0.000
• Congressional General Reductions	-0.002	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.151	-			

Change Summary Explanation

- Beginning in FY 2018 all project 990 funds will transfer to PE 1206308A, Project FE5.
- Beginning in FY 2018 all project EB7 funds transition to PE 1206308A project FE6 and PE 1205117A project FG3.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603308A / Army Space Systems Integration				Project (Number/Name) 990 / Space And Missile Defense Integration			
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
990: Space And Missile Defense Integration	-	12.638	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.638
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY 2018 project transitions to PE 120630A Project FE5

A. Mission Description and Budget Item Justification

USASMD/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMD/ARSTRAT as the Army proponent for space and ground-based midcourse defense (GBMD), the Army integrator for global missile defense, and the Army Service Component Command (ASCC) of the U.S. Strategic Command (USSTRATCOM). Army Regulation (AR) 10-87 Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007 and AR 5-22 The Army Force Modernization Proponent System dated 19 August 2009 designate USASMD/ARSTRAT as the Army specified proponent for Global Missile Defense and Space/High Altitude capabilities. As the Army proponent for space, high altitude and GMD, USASMD/ARSTRAT develops warfighting concepts, conducts warfighting experiments to validate those concepts, identifies capabilities needed to implement the validated concepts, and develops Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize the GBMD capabilities. As the Army integrator for global missile defense, USASMD/ARSTRAT is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM to execute its global missile defense responsibilities.

Project 990 funds United States Army Space and Missile Command/Army Strategic Command (USASMD/ARSTRAT) efforts to develop, analyze and mature warfighting concepts, and conduct warfighting experiments for space and high altitude capabilities. The program also funds development and integration of new data sources and data services into the Joint Friendly Force Tracking Mission Management Center. The Mission Management Center (MMC) injects real-time Joint Friendly Force Tracking (J-FFT) information into the Common Operating Picture for Combatant Commands (COCOMs), Joint Task Forces (JTFs) and Coalition partners. USASMD/ARSTRAT is the proponent for space / high altitude capabilities and is responsible for determining and integrating Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF-P) for the Army.

USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DOD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMD/ARSTRAT as the lead USSTRATCOM component command for J-FFT.

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

	FY 2017	FY 2018	FY 2019
Title: Architecture Development, Wargames and Demonstrations	8.635	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A / Army Space Systems Integration	Project (Number/Name) 990 / Space And Missile Defense Integration

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
Description: Funding is provided for the following efforts			
Title: Joint Friendly Force Tracking (J-FFT) Testbed	4.003	-	-
Description: Funding is provided for the following efforts			
Accomplishments/Planned Programs Subtotals	12.638	-	-

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

N/A

Remarks

D. Acquisition Strategy

Not applicable for this effort.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A / Army Space Systems Integration	Project (Number/Name) 990 / Space And Missile Defense Integration
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Enhancement of J-FFT	C/CPFF	Colorado Springs : Colorado	30.866	3.975		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			30.866	3.975		-		-		-		-	Continuing	Continuing	N/A

Remarks
The prime contractor was awarded a task order contract in September 2006. Multiple follow-on task orders have been awarded under this contract since award of the basic contract. All current task orders are scheduled to expire by the end of FY16.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
GOVT SUPPORT & SUPPORT CONTRACTS	C/CPFF	Various in Colorado Springs CO, Washington DC, and Huntsville AL : Various	126.945	8.663		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			126.945	8.663		-		-		-		-	Continuing	Continuing	N/A

Remarks
The prime contractor was awarded a task order contract in September 2006. Multiple follow-on task orders have been awarded under this contract since award of the basic contract. All current task orders are scheduled to expire by the end of FY16.

Project Cost Totals	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
	157.811	12.638	0.000	-	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A / Army Space Systems Integration	Project (Number/Name) 990 / Space And Missile Defense Integration

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Development/synchronization of Army space and BMD DOTMLPP	█				█																							
Provide 24/7 support to Friendly Force Tracking.	█				█																							
Jericho Thunder Analysis Support	█				█																							
SMDC NanoSat Analysis (SNAP, KE)	█				█																							
Cyber Impacts on Space Capabilities	█				█																							
Space Superiority Joint Architecture Analysis	█				█																							
Force Design Assessment of Army Forces	█				█																							
Operational Implications to the Joint Warfighter of Islamic State c	█				█																							
Army Space Aggressors in Support of Readiness	█				█																							
NAVWAR/PNT in a Denied Environment	█				█																							
Implications of the Emerging "Third" Offset Strategy for SMDC Space			█		█																							
Surveillance and Reconnaissance (S&R) Small-Satellites	█				█																							
Small-Satellites for Data Proliferation in Direct Warfighter Supp	█				█																							

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A / Army Space Systems Integration	Project (Number/Name) 990 / Space And Missile Defense Integration

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Narrowband Consolidated SATCOM System	█	█	█	█																								
Army Requirements for Space Situational Awareness (SSA)	█	█	█	█																								
Analysis of Tactical Army Space Situational Awareness	█	█	█	█																								
JCIDS work on JTAGS Transition ORD into a CPD	█	█	█	█																								
Space Superiority Capability Production Document	█	█	█	█																								
Kestral Eye Requirement Development	█	█	█	█																								
Space Simulation Support to TRADOC ARCIC Experimentation	█	█	█	█																								
Common Ground Station Operating Concept and Requirement Docum	█	█	█	█																								
NAVWAR Characterization Operating Concept and Requirement	█	█	█	█																								
JFFT Capability Development Document	█	█	█	█																								
High Altitude Peersistent Platform Initial or Capability Developme	█	█	█	█																								
NAVWAR/PNT in Denied Environment	█	█	█	█																								

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A / Army Space Systems Integration	Project (Number/Name) 990 / Space And Missile Defense Integration

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Development/synchronization of Army space and BMD DOTMLPF solutions.	1	2015	4	2017
Provide 24/7 support to Friendly Force Tracking.	1	2016	4	2017
Integrate KeyMaker into FFT	1	2016	4	2016
Jericho Thunder Analysis Support	1	2015	4	2017
SMDC NanoSat Analysis (SNAP, KE)	1	2015	4	2017
Cyber Impacts on Space Capabilities	3	2016	2	2017
Space Superiority Joint Architecture Analysis	1	2015	4	2017
Force Design Assessment of Army Forces	3	2016	3	2017
Operational Implications to the Joint Warfighter of Islamic State of Iraq	1	2017	4	2017
Army Space Aggressors in Support of Readiness	1	2017	4	2017
NAVWAR/PNT in a Denied Environment	1	2017	4	2017
Implications of the Emerging "Third" Offset Strategy for SMDC Space	3	2017	4	2017
Surveillance and Reconnaissance (S&R) Small-Satellites	3	2016	2	2017
Small-Satellites for Data Proliferation in Direct Warfighter Support	3	2016	2	2017
Narrowband Consolidated SATCOM System	3	2016	2	2017
Army Requirements for Space Situational Awareness (SSA)	4	2016	3	2017
Analysis of Tactical Army Space Situational Awareness	4	2016	3	2017
JCIDS work on JTAGS Transition ORD into a CPD	3	2016	4	2017
Space Superiority Capability Production Document	4	2015	2	2017
Kestral Eye Requirement Development	1	2017	4	2017
Space Simulation Support to TRADOC ARCIC Experimentation	1	2015	4	2017
ARGOS operating Concept and Requirement Document	2	2016	2	2016

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A / <i>Army Space Systems Integration</i>	Project (Number/Name) 990 / <i>Space And Missile Defense Integration</i>

Events	Start		End	
	Quarter	Year	Quarter	Year
Common Ground Station Operating Concept and Requirement Document	2	2017	4	2017
NAVWAR Characterization Operating Concept and Requirements Document	4	2016	4	2017
JFFT Capability Development Document	4	2016	4	2017
High Altitude Peersistent Platform Initial or Capability Development Document	1	2017	3	2017
NAVWAR/PNT in Denied Environment	1	2017	4	2017

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603308A / Army Space Systems Integration			Project (Number/Name) EB7 / Army Space System Enhancement/ Integration				
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
EB7: Army Space System Enhancement/Integration	-	19.640	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.640
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Note

Funding transferred from PE 0603308A project EB7 transition to PE 1206308A project FE6 and PE 1205117A project FG3 beginning in FY 2018.

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

Funding line is shared between USA Space and Missile Defense Command (SMDC) and Program Executive Office Intelligence, Electronic Warfare and Sensors (PEO IEW&S) starting in FY2018. Funding transferred from PE 0603308A project EB7 transition to PE 1206308A project FE6 and PE 1205117A project FG3 beginning in FY 2018.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603327A / <i>Air and Missile Defense Systems Engineering</i>
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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	-	6.100	57.649	42.802	1.000	43.802	43.273	42.642	35.597	29.108	0.000	258.171
FG9: <i>Air and Missile Defense (AMD) Electronic Warfare</i>	-	6.100	57.649	42.802	1.000	43.802	43.273	42.642	35.597	29.108	0.000	258.171

A. Mission Description and Budget Item Justification

Funding in this program supports efforts to assess Army Air and Missile Defense (AMD) performance and system vulnerabilities to threats from Cyber and Electromagnetic Activities (CEMA). Army AMD sensors, Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) Command and Control (C2), Radio Frequency (RF) data and voice networks will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Analysis of results and implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army AMD systems, to include other Service and other Agency AMD systems as appropriate. Upon completion of CEMA demonstration analyses, create concepts for mitigating Army AMD sensor, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army AMD systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army AMD CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Collaboration is required with United States Strategic Command (USSTRATCOM) Joint Electromagnetic Preparedness for Advanced Combat (JEPAC) to evaluate, modify, and field existing Army AMD EP Tactics, Techniques, and Procedures (TTPs) in a Joint environment. Additionally, there will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. An output from these activities will be development of a time-phased roadmap that identifies the investments needed to improve the CEMA capabilities of Army AMD sensors, C2, and RF data and voice networks.

Funds in this line will also be used to transition the Army Low-Cost Portable Surveillance (ALPS) sensor from Science and Technology (S&T) into an emerging Program of Record (PoR). Initially, prototype systems will be provided to meet Combatant Commands identified needs and to conduct an operational assessment. This program will also develop and integrate ALPS into the Army Integrated Air & Missile Defense (AIAMD) Battle Command System (IBCS) to improve the CEMA posture of the Army's AMD architecture. The objectives of this effort are to prove component and subsystem maturity in a system-of-systems environment and to reduce subsequent PoR integration risk.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603327A / <i>Air and Missile Defense Systems Engineering</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	14.200	48.949	35.795	-	35.795
Current President's Budget	6.100	57.649	42.802	1.000	43.802
Total Adjustments	-8.100	8.700	7.007	1.000	8.007
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	8.700			
• Congressional Directed Transfers	-	-			
• Reprogrammings	6.100	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	7.007	1.000	8.007
• RAA not appropriated	-14.200	-	-	-	-

Change Summary Explanation

The FY 2017 net change of -\$8.100 million includes: -\$14.200 million in the March 2017 Request for Additional Appropriations but not funded in the FY 2017 Appropriations Act and +\$6.100 million approved in the Missile Defeat Enhancements Above Threshold Reprogramming Action.

FY18 Congressional Add of \$8.7M for Missile Defeat and Defense Enhancements.

The FY 2019 Base +\$7.007 million includes: -\$0.135 million for CEMA and +\$7.142 million for ALPS in support of the Asia Pacific Security Initiative.

The FY 2019 OCO funding is for ALPS.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering				Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare			
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
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	6.100	57.649	42.802	1.000	43.802	43.273	42.642	35.597	29.108	0.000	258.171
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding in this program supports efforts to assess Army Air and Missile Defense (AMD) performance and system vulnerabilities to threats from Cyber and Electromagnetic Activities (CEMA). Army AMD sensors, Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) Command and Control (C2), Radio Frequency (RF) data and voice networks will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Analysis of results and implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army AMD systems, to include other Service and other Agency AMD systems as appropriate. Upon completion of CEMA demonstration analyses, create concepts for mitigating Army AMD sensor, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army AMD systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army AMD CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Collaboration is required with United States Strategic Command (USSTRATCOM) Joint Electromagnetic Preparedness for Advanced Combat (JEPAC) to evaluate, modify, and field existing Army AMD EP Tactics, Techniques, and Procedures (TTPs) in a Joint environment. Additionally, there will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. An output from these activities will be development of a time-phased roadmap that identifies the investments needed to improve the CEMA capabilities of Army AMD sensors, C2, and RF data and voice networks.

Funds in this line will also be used to transition the Army Low-Cost Portable Surveillance (ALPS) sensor from Science and Technology (S&T) into an emerging Program of Record (PoR). Initially, prototype systems will be provided to meet Combatant Commands' identified needs and to conduct an operational assessment. This program will also develop and integrate ALPS into the Army Integrated Air & Missile Defense (AIAMD) Battle Command System (IBCS) to improve the CEMA posture of the Army's AMD architecture. The objectives of this effort are to prove component and subsystem maturity in a system-of-systems environment and to reduce subsequent PoR integration risk.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Advanced Electronic Protection Enhancements and ALPS Development/Integration	6.100	57.649	42.802	1.000	43.802
Description: Provides Cyber and Electromagnetic Activities (CEMA) planning, conducts CEMA demonstrations and post-mission analysis, and develop/integrate Army Low-Cost Portable Surveillance (ALPS).					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering	Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p><i>FY 2018 Plans:</i> Funding is provided for additional analysis of the P-11 event output, along with initial planning and preparation for the P-12 event. Funding will also be used to continue the Cyber and Electromagnetic Activities (CEMA) roadmap and strategy that ensures coordination and execution of prioritized goals. Virtualize Integrated Air and Missile Defense (IAMD) and PATRIOT components, validate the models, and assess them in a contested environment. Begin virtualization of additional IAMD sensors and launchers. Continue ALPS development and integration of ALPS into the Army Air and Missile Defense (AMD) architecture. ALPS prototype systems will be acquired and deployed to address emergency warfighting requirements in support of an Operational Needs Statement as identified in the FY2018 Missile Defeat and Defense Enhancements Budget Amendment.</p> <p><i>FY 2019 Base Plans:</i> Funding is provided for continued planning and preparation and to conduct the P-12 event. Funding will also be used to continue the Cyber and Electromagnetic Activities (CEMA) roadmap and strategy that ensures coordination and execution of prioritized goals. Virtualize IAMD and PATRIOT components, validate the models, and assess them in a contested environment. Continue virtualization of additional IAMD sensors and launchers. Continue ALPS development and integration of ALPS into the Army AMD architecture.</p> <p><i>FY 2019 OCO Plans:</i> Funds will be used to conduct an operational assessment of prototype systems in support of a Combatant Command identified need. The operational assessment will be used to evaluate the performance of the fielded prototypes to inform and reduce risk for transition to production and fielding under the traditional acquisition system.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> The net \$5.647 million reduction from FY 2018 to FY 2019 is primarily based on: a \$14.5 million OCO reduction; an ALPS increase, mostly driven by additional funding in support of the Asia Pacific Security Initiative; and a reduction in assumed inflation.</p>					
Accomplishments/Planned Programs Subtotals	6.100	57.649	42.802	1.000	43.802

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks Not applicable for this item.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering	Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare

D. Acquisition Strategy

Assessment events will be conducted approximately every two years in live and simulated CEMA environments. In addition to government planning and conduct of assessments, funding will also be provided through various contracts for subject matter expertise.

ALPS will utilize an existing Defense Ordnance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) agreement to develop and integrate prototypes in the Army AMD architecture. An operational assessment will be used to refine ALPS requirements and assess the longer-term strategy.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603327A / Air and Missile Defense Systems Engineering				FG9 / Air and Missile Defense (AMD) Electronic Warfare							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Government Program Management	Various	Various : Various	-	-		2.831	Nov 2017	1.688	Nov 2018	-		1.688	Continuing	Continuing	Continuing
Subtotal			-	-		2.831		1.688		-		1.688	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
System Integration Assessment	Various	Various : Various	-	-		1.538	Dec 2017	4.850	Nov 2018	-		4.850	Continuing	Continuing	Continuing
ALPS Development/Integration	Various	Various : Various	-	6.100	Nov 2017	33.741	Jan 2018	20.174	Jan 2019	1.000	Jan 2019	21.174	Continuing	Continuing	Continuing
Subtotal			-	6.100		35.279		25.024		1.000		26.024	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Component Assessments & Research and Trade Studies	Various	Various : Various	-	-		15.339	Feb 2018	6.150	Feb 2019	-		6.150	Continuing	Continuing	Continuing
Subtotal			-	-		15.339		6.150		-		6.150	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Demonstration Planning and Execution	Various	Various : Various	-	-		4.200	Nov 2017	9.940	Nov 2018	-		9.940	Continuing	Continuing	Continuing
Subtotal			-	-		4.200		9.940		-		9.940	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering				Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare				
	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	-	6.100	57.649		42.802	1.000	43.802	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering	Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
P-11 Demonstration Planning Efforts	█																											
P-11 Demonstration					█																							
P-11 Analysis Efforts, Trade Studies, and Implementation					█																							
P-12 Demonstration Planning Efforts					█																							
P-12 Demonstration									█																			
P-12 Analysis Efforts, Trade Studies, and Implementation									█																			
P-13 Demonstration Planning Efforts													█															
P-13 Demonstration																	█											
P-13 Analysis Effort, Trade Studies, and Implementation																	█											
P-14 Demonstration Planning Efforts																					█							
ALPS Prototype Development and Integration					█				█				█				█				█							

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603327A / <i>Air and Missile Defense Systems Engineering</i>	Project (Number/Name) FG9 / <i>Air and Missile Defense (AMD) Electronic Warfare</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
P-11 Demonstration Planning Efforts	1	2017	1	2018
P-11 Demonstration	2	2018	3	2018
P-11 Analysis Efforts, Trade Studies, and Implementation	3	2018	1	2019
P-12 Demonstration Planning Efforts	3	2018	2	2019
P-12 Demonstration	3	2019	4	2019
P-12 Analysis Efforts, Trade Studies, and Implementation	1	2020	4	2020
P-13 Demonstration Planning Efforts	4	2020	2	2021
P-13 Demonstration	3	2021	3	2021
P-13 Analysis Effort, Trade Studies, and Implementation	4	2021	2	2022
P-14 Demonstration Planning Efforts	1	2022	4	2022
ALPS Prototype Development and Integration	4	2017	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>
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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	-	65.062	72.909	45.254	-	45.254	98.627	99.600	90.277	86.116	Continuing	Continuing
606: <i>Cntrmn/Barrier Adv Dev</i>	-	0.000	4.149	2.968	-	2.968	12.144	16.802	11.859	9.880	0.000	57.802
EK7: <i>Area Denial Capability Development</i>	-	65.062	68.760	42.286	-	42.286	86.483	82.798	78.418	76.236	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) provides for the Concept Exploration and Refinement of Terrain Shaping Obstacles. This PE develops alternatives to the Family of Scatterable Mines systems.

Project 606 enables component development of a new detection capability for explosive hazards, improvised explosive devices (IED), and components in support of route clearance operations. These capabilities will enhance the effectiveness of the Route Clearance Platoon within the Engineer Company, the Brigade Combat Team as well as other related Army missions.

Project EK7 Area Denial Capability Development will evaluate integrated technologies and prototype systems in a realistic operating environment to expedite technology transition for Terrain Shaping Obstacles. The obstacles will deny the enemy terrain and freedom of action while allowing friendly forces to maneuver freely within the same battle space. Area Denial Capability Development provides controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. Area Denial Capability Development enables the Combatant Commander to shape the battle space of an area without exposing friendly forces to enemy engagement, and to actively detect and engage the enemy at all operational ranges. Area Denial Capability Development will utilize an open system, modular architecture to facilitate future development, maintenance, repair, and product improvements.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	72.117	72.909	76.845	-	76.845
Current President's Budget	65.062	72.909	45.254	-	45.254
Total Adjustments	-7.055	0.000	-31.591	-	-31.591
• Congressional General Reductions	-0.035	-	-	-	-
• Congressional Directed Reductions	-	-	-	-	-
• Congressional Rescissions	-	-	-	-	-
• Congressional Adds	-	-	-	-	-
• Congressional Directed Transfers	-	-	-	-	-
• Reprogrammings	-4.280	-	-	-	-
• SBIR/STTR Transfer	-2.740	-	-	-	-
• Adjustments to Budget Years	-	-	-31.591	-	-31.591

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army Date: February 2018

Appropriation/Budget Activity
2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)

R-1 Program Element (Number/Name)
PE 0603619A / Close Combat Systems Adv Dev

Change Summary Explanation

FY 2017 Project 606 reprogramming removed funding in the amount of \$3.612 million.
FY 2017 Project EK7 reprogramed funds in the amount of \$0.668 million to Project ER2.
FY 2017 Project EK7 budget delta in the amount of -\$2.597 million is attributable to SBIR/STTR reductions; FFRDC reduction in the amount of \$0.033 million.
The FY 2019 Project EK7 funding request was reduced by \$31.410 million to account for the availability of prior year execution balances.
The FY 2019 Project 606 funding was reduced by \$0.181 million to account for the availability of prior year execution balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) 606 / <i>Cntrmn/Barrier Adv Dev</i>
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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
606: <i>Cntrmn/Barrier Adv Dev</i>	-	0.000	4.149	2.968	-	2.968	12.144	16.802	11.859	9.880	0.000	57.802
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 606 Countermine/Barrier Advanced Development enables development and evaluation of technologies that will perform detection, neutralization, and clearing of landmines and Improvised Explosive Devices (IEDs) at operational speeds.

The Forward Reconnaissance and Explosive Hazard Detection (FREHD) system is a suite of four capabilities for use by route clearance patrols to provide standoff detection of explosive hazards: vehicle mounted anomaly detection; pinpoint explosive hazard detection; explosive hazard vapor and particle detection; and remote visualization. FREHD increases the rate of advance of the route clearance formation while removing Soldiers and equipment from the proximity of blast and fragmentation.

The FY 2019 Base Research, Development, Test & Evaluation (RDTE) dollars in the amount of \$2.968 million supports the Milestone Decision Authority (MDA) delegation, the Materiel Development Decision (MDD), Analysis of Alternatives (AoA), and Milestone documentation in preparation for the initiation of the Technology Maturation and Risk Reduction (TMRR) phase for the Forward Reconnaissance and Explosive Hazard Detection (FREHD) system.

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

	FY 2017	FY 2018	FY 2019
<p>Title: HMDS System Engineering and Program Management</p> <p>Description: Supports System Engineering and Program Management</p> <p>FY 2018 Plans: Supports System Engineering and Program Management</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: In FY19, HMDS has no requirement.</p>	-	1.435	-
<p>Title: HMDS Explosive Hazard Detection Technology Development</p> <p>Description: Explosive Hazard Detection Technology Analysis</p> <p>FY 2018 Plans: Explosive Hazard Detection development and evaluation of evolving technologies</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p>	-	2.440	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) 606 / <i>Cntrmn/Barrier Adv Dev</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
In FY19, HMDS has no requirement.			
Title: HMDS Explosive Hazard Detection Test and Evaluation Description: Explosive Hazard Detection Test and Evaluation FY 2018 Plans: Conduct testing of candidate technologies. FY 2018 to FY 2019 Increase/Decrease Statement: in FY19, HMDS has no requirement.	-	0.274	-
Title: Forward Reconnaissance and Explosive Hazard Detection (FREHD) FY 2019 Plans: Conduct the Milestone Decision Authority (MDA) delegation, the Materiel Development Decision (MDD), the Analysis of Alternatives (AoA) and the Milestone documentation for the initiation of Technology Maturation and Risk Reduction (TMRR) FY 2018 to FY 2019 Increase/Decrease Statement: Forward Reconnaissance and Explosive Hazard Detection (FREHD) will be a new start in FY 2019.	-	-	2.968
Accomplishments/Planned Programs Subtotals	-	4.149	2.968

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
• 415: <i>PE 0604808A Proj 415 Mine Neutralization/Detection</i>	29.403	19.848	39.364	-	39.364	34.669	41.709	45.644	44.857	Continuing	Continuing
• R64001: <i>HUSKY MOUNTED DETECTION SYSTEM (HMDS)</i>	0.274	21.695	40.834	-	40.834	53.741	75.450	45.454	43.980	0.000	281.428

Remarks
PE 0604808 Project 415 Mine Neutralization and Detection is the engineering development follow-on to this funding line, and is a shared project line. The above profile represents the total line, not only the follow on tasks within this program.

D. Acquisition Strategy
The Acquisition Strategy for Route Clearance Operations will be developed in conjunction with program initiation.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army Date: February 2018

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 4	PE 0603619A / <i>Close Combat Systems Adv Dev</i>	606 / <i>Cntrmn/Barrier Adv Dev</i>

The Husky Mounted Detection System (HMDS) program is pursuing an acquisition approach that delivers capability to the Warfighter by leveraging the Quick Reaction Capability (QRC) Ground Penetrating Radar (GPR) currently deployed in support of Operation Enduring Freedom (OEF) and Operation Inherent Resolve (OIR). In FY 2018, as part Engineering Development activities, the program will execute an ECP to add a wire detection capability to address evolving threat, and Infrared illumination to enable nighttime operation. A second ECP to improve operational availability of the HMDS during inclement weather and address obsolescence and Cyber Security deficiencies will follow. As part of the Advanced Development activities, the HMDS Program will conduct additional development and evaluation of technologies to address a broader spectrum of emerging threats, interoperability with electronic countermeasures, and detection and neutralization of landmines and Improvised Explosive Devices (IEDs) at operational speeds.

The Forward Reconnaissance Explosive Hazard Detection (FREHD) program will conduct an Analysis of Alternatives (AoA) in FY 2019. Results of the AoA will support the development of the acquisition strategy. The requirement identifies four capabilities: Forward Anomaly Detection, Pinpoint Explosive Hazard Detection, Explosive Hazard Vapor and Particle Detection, and Remote Visualization.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / Close Combat Systems Adv Dev	Project (Number/Name) 606 / Cntrmn/Barrier Adv Dev
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Program Management - HMDS	MIPR	PM Terrestrial Sensors : Fort Belvoir, VA	-	-		0.300		-		-		-	Continuing	Continuing	-
Program Management - FREHD	Allot	PM CCS : Picatinny Arsenal, NJ	-	-		-		0.133	Mar 2019	-		0.133	Continuing	Continuing	-
Subtotal			-	-		0.300		0.133		-		0.133	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
HMDS To Be Determined	TBD	TBD : TBD	-	-		1.742		-		-		-	0.000	1.742	-
Subtotal			-	-		1.742		-		-		-	0.000	1.742	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
HMDS Explosive Hazard Detection - Technology Analysis	MIPR	TRADOC : Ft. Eustis, VA	-	-		0.488		-		-		-	Continuing	Continuing	-
HMDS Explosive Hazard Detection - Engineering Support	MIPR	CERDEC NVESD : Ft. Belvoir, VA	-	-		1.115		-		-		-	Continuing	Continuing	-
HMDS Explosive Hazard Detection - System Analysis and Test Design	FFRDC	IDA : Alexandria, VA	-	-		0.230		-		-		-	Continuing	Continuing	-
FREHD	MIPR	Various : Various	-	-		-		2.835	Mar 2019	-		2.835	0.000	2.835	-
Subtotal			-	-		1.833		2.835		-		2.835	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) 606 / <i>Cntrmn/Barrier Adv Dev</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				
	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	
HMDS																													
Explosive Hazard Detection - technology development, test and ev																													
Advanced Development efforts for technology transition																													
Forward Reconnaissance and Explosive Hazard Detection (FREHD)																													
FREHD Materiel Development Decision (MDD)									▲ 1																				
FREHD Analysis of Alternatives (AoA)																													
FREHD Milestone (MS) A													▲ 2																
FREHD Technology Maturation and Risk Reduction (TMRR) Contract Award													▲ 3																
FREHD Technology Maturation and Risk Reduction (TMRR)																													
FREHD Milestone (MS) B																	▲ 4												
FREHD Engineering Manufacturing Development (EMD) Contract Award																					▲ 5								
FREHD Engineering Manufacturing Development (EMD)																													

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) 606 / <i>Cntrmn/Barrier Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
HMDS	1	2018	4	2022
Explosive Hazard Detection - technology development, test and evaluation	2	2017	4	2019
Advanced Development efforts for technology transition	1	2019	4	2022
Forward Reconnaissance and Explosive Hazard Detection (FREHD)	1	2019	4	2023
FREHD Materiel Development Decision (MDD)	2	2019	2	2019
FREHD Analysis of Alternatives (AoA)	2	2019	2	2020
FREHD Milestone (MS) A	2	2020	2	2020
FREHD Technology Maturation and Risk Reduction (TMRR) Contract Award	2	2020	2	2020
FREHD Technology Maturation and Risk Reduction (TMRR)	3	2020	4	2022
FREHD Milestone (MS) B	2	2022	2	2022
FREHD Engineering Manufacturing Development (EMD) Contract Award	2	2023	2	2023
FREHD Engineering Manufacturing Development (EMD)	3	2023	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>			Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>				
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
<i>EK7: Area Denial Capability Development</i>	-	65.062	68.760	42.286	-	42.286	86.483	82.798	78.418	76.236	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides for the development of Terrain Shaping Obstacles.

Area Denial Capability Development will evaluate integrated technologies and prototype systems in a realistic operating environment to expedite technology transition for Terrain Shaping Obstacles. The obstacles will deny the enemy terrain and freedom of action while allowing friendly forces to maneuver freely within the same battlespace. Area Denial Capability Development provides controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. Area Denial Capability Development enables the Combatant Commander to shape the battle space of an area without exposing friendly forces to enemy engagement, and to actively detect and engage the enemy at all operational ranges. Area Denial Capability Development will utilize an open system, modular architecture to facilitate future development, maintenance, repair, and product improvements.

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

	FY 2017	FY 2018	FY 2019
Title: Area Denial Capability Development	42.770	51.386	26.671
Description: Develop and build system and sub-system level concepts that will be evaluated for affordability, feasibility, and technical maturity. Complete competitive development of systems and perform initiatives to mature technical feasibility and reduce risk.			
FY 2018 Plans: Award contract agreements to conduct analysis on delivery bomb unit and integration with aircraft. Develop the Capability Development Document (CDD) requirements, conduct technical activities to reduce program technical and cost risk.			
FY 2019 Plans: Will conduct analysis of munitions delivery system alternatives. Prepare for Milestone A decision to develop Terrain Shaping Obstacle munitions. Will award contract agreements to mature munitions technology and reduce program technical and cost risk.			
FY 2018 to FY 2019 Increase/Decrease Statement: Area Denial Capability Development was decreased to account for the availability of prior year execution balances.			
Title: Engineering Support	13.793	10.156	10.739
Description: Provide Engineering Support.			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p><i>FY 2018 Plans:</i> Engineering support to execute contract agreements to conduct analysis on delivery bomb unit and integration with aircraft. Continue developing models and simulations, achieve Milestone A decision, conduct technology readiness assessments, and support requirements development.</p> <p><i>FY 2019 Plans:</i> Will provide engineering support to analyze munitions delivery system alternatives, achieve Milestone A decision to develop Terrain Shaping Obstacle munitions, and award contract agreements to mature munitions technology and reduce program technical and cost risk.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Engineering Support cost was increased due to updated cost estimate.</p>			
<p><i>Title:</i> Test and Evaluation</p> <p><i>Description:</i> Provide support to Contractor/Government test Activities.</p>	0.336	-	-
<p><i>Title:</i> Program Management and Oversight</p> <p><i>Description:</i> Program Management and Support</p> <p><i>FY 2018 Plans:</i> Program Management support for technical/engineering analysis of the materiel solution and management of contract agreements to conduct analysis on delivery bomb unit and integration with aircraft. Prepare the requirements for two Technology Maturation and Risk Reduction (TMRR) phase contracts/agreements.</p> <p><i>FY 2019 Plans:</i> Will provide Program Management support to analyze munitions delivery system alternatives, achieve Milestone A decision to develop Terrain Shaping Obstacle munitions, and award contract agreements to mature munitions technology and reduce program technical and cost risk. Will conduct industry engagements and award Technology Maturation and Risk Reduction phase contracts/agreements to develop Terrain Shaping Obstacle munitions.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Program Management and Oversight costs were decreased due to reduced internal operating budget.</p>	8.163	7.218	4.876
Accomplishments/Planned Programs Subtotals	65.062	68.760	42.286

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

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>

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

Remarks

N/A

D. Acquisition Strategy

The Dominating Mobility Through Terrain Shaping and Engagement (DMTTS&E) Initial Capabilities Document (ICD) was approved by the Joint Requirements Oversight Council (JROC) on 3 October 2014. The DMTTS&E ICD documents Terrain Shaping Obstacle (TSO) requirements at all operational ranges including those within line-of-sight and those that are beyond line-of-sight. The Army awarded four concept prototype contracts/agreements to develop representative prototypes (hardware and/or models) which were used to assess the TSO concepts, technical risks, and costs of potential munitions systems and associated capabilities. The Army intends to develop the TSO munitions system and associated capabilities. The TSO system will eventually be packaged into various delivery methods for employment at all operational ranges; however, the Army plans to initially demonstrate the TSO capability at close operational ranges. The Army intends to competitively award up to two Technology Maturation and Risk Reduction (TMRR) contracts/agreements in FY 2019 to develop competing prototypes of the TSO munitions and associated capabilities, which includes close-range delivery mechanisms. As the munitions system matures, the items will be available for integration into additional delivery methods for employment across the entire range of operations.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Program	MIPR	PM-CCS : Picatinny Arsenal, NJ	3.841	8.163		4.474		3.248		-		3.248	Continuing	Continuing	-
SBIR/STTR/FFRDC	TBD	PM CCS : Picatinny Arsenal, NJ	-	-		2.750		1.628		-		1.628	Continuing	Continuing	-
Subtotal			3.841	8.163		7.224		4.876		-		4.876	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Prototype Development A	SS/CPFF	Orbital ATK : Plymouth, MN	8.351	6.453	Jun 2017	-		-		-		-	0.000	14.804	-
Prototype Development B	SS/CPFF	Textron Defense Systems : Wilmington, MA	7.829	7.669	Jun 2017	-		-		-		-	0.000	15.498	-
Prototype Development C	SS/FFP	Fantastic Data LLC : San Fransisco, CA	7.363	3.117	Jun 2017	-		-		-		-	0.000	10.480	-
Prototype Development D	SS/CPFF	Northrop Grumman Systems Corporation : Redondo Beach, CA	3.028	3.945	Jun 2017	-		-		-		-	0.000	6.973	-
Warhead Technology Study	SS/CPFF	Various : Various	-	1.586	Aug 2017	-		-		-		-	0.000	1.586	-
Top Attack Prototype Development A	SS/CPFF	Orbital ATK : Plymouth, MN	-	8.000	Aug 2017	-		-		-		-	0.000	8.000	-
Top Attack Prototype Development B	SS/CPFF	Textron Defense Systems : Wilmington, MA	-	10.000	Sep 2017	-		-		-		-	0.000	10.000	-
Technology Maturation Risk Reduction (TMRR) Development A	C/TBD	TBD : TBD	-	-		25.690	Jun 2018	13.336	Jun 2019	-		13.336	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / Close Combat Systems Adv Dev	Project (Number/Name) EK7 / Area Denial Capability Development
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Technology Maturation Risk Reduction (TMRR) Development B	C/TBD	TBD : TBD	-	-		25.690	Jun 2018	13.335	Jun 2019	-		13.335	Continuing	Continuing	-
ARL Common Sensor Radio Development	MIPR	ARL : ADELPHI,MD	-	2.000		-		-		-		-	0.000	2.000	-
Subtotal			26.571	42.770		51.380		26.671		-		26.671	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
ARDEC Engineering Support	MIPR	ARDEC : Picatinny Arsenal, NJ	3.484	6.336		5.110		6.127		-		6.127	Continuing	Continuing	-
ARDEC Warhead Technologies Study	MIPR	ARDEC : Picatinny Arsenal, NJ	-	1.090		-		-		-		-	2.700	3.790	-
Dynamic Capabilities	MIPR	ARDEC : Picatinny Arsenal, NJ	-	0.174		-		-		-		-	0.000	0.174	-
ARDEC Threat Detection Study	MIPR	ARDEC : Picatinny Arsenal, Nj	-	0.384		-		-		-		-	0.514	0.898	-
ARDEC Counter Countermeasures Study	MIPR	ARDEC : Picatinny Arsenal, NJ	-	0.405		-		-		-		-	0.570	0.975	-
CERDEC Engineering Support	MIPR	CERDEC : Fort Belvoir, VA	0.497	0.562		0.275		0.921		-		0.921	Continuing	Continuing	-
NVESD Engineering Support	MIPR	NVESD : Fort Belvoir, VA	0.440	0.453		0.800		0.518		-		0.518	Continuing	Continuing	-
Mitre Engineering Support (C4)	FFRDC	Mitre : McLean, VA	0.863	1.834	Oct 2017	1.000		1.080		-		1.080	Continuing	Continuing	-
Fibertek, INC. Operational Contractor Support	C/CPFF	FIBERTEK, INC. : Herndon, VA	0.131	0.470	May 2017	0.500		-		-		-	0.000	1.101	-
Millenium Program Support	C/FFP	Millenium Corporation : Picatinny Arsenal, NJ	-	0.023	Jan 2017	-		-		-		-	0.000	0.023	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>
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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
ARL Engineering Support	MIPR	ARMY RESEARCH LABORATORY (ARL) : Adelphi, MD	0.633	0.853		0.850		0.808		-		0.808	Continuing	Continuing	-
AMSAA Engineering Support	MIPR	Army Materiel Systems Analysis Activity (AMSAA) : Aberdeen, MD	0.663	-		0.215		-		-		-	0.000	0.878	-
TRAC Analysis Support	MIPR	TRADOC Analysis Center (TRAC) : White Sands, NM	2.200	-		-		-		-		-	0.000	2.200	-
USAF Engineering and Integration Support	SS/CPFF	Air Force Life Cycle Management Center, Armament Systems Development Division : Eglin AFB, FL	1.191	1.209	Aug 2017	1.200		1.285		-		1.285	Continuing	Continuing	-
USN Engineering and Integration Support	MIPR	TBD : TBD	-	-		0.206		-		-		-	Continuing	Continuing	-
Subtotal			10.102	13.793		10.156		10.739		-		10.739	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Prototype Development Demonstration	MIPR	USAF 96th Test Squadron / OGEX : Eglin AFB, FL	0.429	0.336		-		-		-		-	Continuing	Continuing	-
Subtotal			0.429	0.336		-		-		-		-	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		40.943	65.062	68.760	42.286	-	42.286	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>
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	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
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Remarks	
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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Model and Simulation Development	[Redacted]				[Redacted]																							
	M&S Dev																											
Concept Prototype Test and Evaluation	[Redacted]				[Redacted]																							
	Concept Prototype T&E																											
Materiel Solution Analysis	[Redacted]				[Redacted]																							
	Materiel Solution Analysis																											
Munitions Delivery System Analysis	[Redacted]				[Redacted]				[Redacted]																			
									Munitions Delivery System Analysis																			
Milestone A - Terrain Shaping Obstacle (TSO) Munitions	[Redacted]				[Redacted]				1																			
									MS A TSO Munitions																			
Technology Maturation and Risk Reduction Agreements Award(s) - TSO Munitions	[Redacted]				[Redacted]				2																			
									Contract Award(s) - TSO Munitions																			
Technology Maturation and Risk Reduction (TMRR) - TSO Munitions	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
													TMRR - TSO Munitions															
Milestone B - TSO Munitions	[Redacted]				[Redacted]				[Redacted]				[Redacted]				3											
																	MS B - TSO Munitions											
Engineering and Manufacturing Development Contract Award(s) - TSO Munitions	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				4							
																					EMD Award(s) - TSO Munitions							
Engineering and Manufacturing Development - TSO Munitions	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
																									EMD - TSO Munitions			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / <i>Close Combat Systems Adv Dev</i>	Project (Number/Name) EK7 / <i>Area Denial Capability Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Area Denial Capability Development	2	2025	1	2026
Model and Simulation Development	1	2016	4	2018
Concept Prototype Build	2	2016	4	2016
Concept Prototype Test and Evaluation	1	2017	1	2017
Analysis of Alternatives	1	2016	4	2016
Materiel Solution Analysis	1	2017	3	2019
Munitions Delivery System Analysis	4	2018	4	2019
Milestone A - Terrain Shaping Obstacle (TSO) Munitions	3	2019	3	2019
Technology Maturation and Risk Reduction Agreements Award(s) - TSO Munitions	3	2019	3	2019
Technology Maturation and Risk Reduction (TMRR) - TSO Munitions	3	2019	2	2022
Milestone B - TSO Munitions	3	2022	3	2022
Engineering and Manufacturing Development Contract Award(s) - TSO Munitions	4	2022	4	2022
Engineering and Manufacturing Development - TSO Munitions	4	2022	3	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603627A / Smoke, Obscurity and Target Defeating Sys AD
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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	-	43.177	7.135	22.700	1.500	24.200	0.000	0.000	0.000	0.000	0.000	74.512
E79: SMOKE/OBSCURANT SYSTEM	-	43.177	7.135	22.700	1.500	24.200	0.000	0.000	0.000	0.000	0.000	74.512

Note

Nuclear Biological Chemical Radiological Vehicle Sensor Suite (NBCRVSS) funding moves to a separate Program Element starting in FY18. It will be reflected under PE 655038, Project Code EQ7.

A. Mission Description and Budget Item Justification

The Screening Obscuration Module (SOM) will provide a man portable mountable and dismountable medium area visual screening obscuration capability for the war fighter. The SOM will increase platform survivability and soldier protection levels of maneuver forces by degrading enemy forces ability to detect US targets in the visual and near infrared region of the electromagnetic spectrum. The SOM will utilize miniaturized obscuration generator technology to produce an effective visual obscuration cloud to screen against enemy forces. This effort replaces obsolete technology used in older smoke pots. The individual Soldier or team will employ the SOM devices on open and complex terrain.

The Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) program provides a Sensor Suite Upgrade (SSU) for the Stryker NBCRV. The NBCRV Sensor Suite is the Mission Equipment Package for the Stryker NBCRV and consists of chemical point detectors, a standoff chemical vapor detector, a biological point detector, a chemical vapor sampling system, radiological detectors, and the Sensor Processing Group. NBCRV SS provides the Stryker NBCRV the ability to detect, identify, collect, report, and mark NBC Hazards. The Stryker NBCRV SSU will improve chemical, biological and radiological and nuclear detection and identification capabilities, and reduce sustainment costs over the current system. A Chemical Surface Detector (CSD) will be developed to replace the Dual Wheel Sampling System to increase maneuver speed when conducting NBC missions and increase reliability.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	44.264	7.135	6.166	-	6.166
Current President's Budget	43.177	7.135	22.700	1.500	24.200
Total Adjustments	-1.087	0.000	16.534	1.500	18.034
• Congressional General Reductions	-0.014	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.073	-			
• Adjustments to Budget Years	-	-	16.534	1.500	18.034

Change Summary Explanation

FY 2019 increase is a result of \$1.5M in OCO programmed in support of CBRN Theater Chem Bio Defense efforts. The increase also supports the CBRN Theatre Chem Bio Defense Effort (\$16.534M).

 Note: FY 2017 reduction is a result of FFRDC and SBIR/STTR reductions.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>					Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>		
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
E79: <i>SMOKE/OBSCURANT SYSTEM</i>	-	43.177	7.135	22.700	1.500	24.200	0.000	0.000	0.000	0.000	0.000	74.512
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY18 funds for NBC Reconnaissance Platform Integration move to PE655038 EQ7.

A. Mission Description and Budget Item Justification

The Screening Obscuration Module (SOM) will provide a man portable mountable and dismountable medium area visual screening obscuration capability for the war fighter. The SOM will increase platform survivability and soldier protection levels of maneuver forces by degrading enemy forces ability to detect US targets in the visual and near infrared region of the electromagnetic spectrum. The SOM will utilize miniaturized obscuration generator technology to produce an effective visual obscuration cloud to screen against enemy forces. This effort replaces obsolete technology used in older smoke pots. The individual Soldier or team will employ the SOM devices on open and complex terrain.

The Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) provides a Sensor Suite Upgrade (SSU) for the NBCRV. The NBCRV Sensor Suite is the Mission Equipment Package for the Stryker NBCRV and consists of chemical point detectors, a standoff chemical vapor detector, a biological point detector, a chemical vapor sampling system, radiological detectors, and the Sensor Processing Group. NBCRV SS provides the Stryker NBCRV the ability to detect, identify, collect, report, and mark NBC Hazards. The Stryker NBCRV SSU will improve chemical, biological and radiological and nuclear detection and identification capabilities, and reduce sustainment costs over the current system. A Chemical Surface Detector (CSD) will be developed to replace the Dual Wheel Sampling System to increase maneuver speed when conducting NBC missions and increase reliability.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: SOM: Product Development	5.289	4.400	2.049	-	2.049
Description: Provide Screening Obscuration Module (SOM) Development.					
FY 2018 Plans: SOM: Continue and complete development of the SOM systems and produce test systems.					
FY 2019 Base Plans: Will continue development, incorporate changes from the DT test.					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>	Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Development was initiated in FY16 and will be in the end of the cycle during these years.					
Title: SOM: Test, Evaluation & OGA's Description: Provide Test and Evaluation of SOM systems FY 2018 Plans: SOM: Continue test and evaluation planning, and initiate funding to test agencies for planning. FY 2019 Base Plans: Will continue test and evaluation planning, and conduct DT testing. FY 2018 to FY 2019 Increase/Decrease Statement: Funding increase as prototypes will be developed and government testing will ramp up.	0.620	1.612	2.835	-	2.835
Title: SOM: Project Management Description: Provide Project Management FY 2018 Plans: SOM: Continue Government program management, systems engineering, and Integrated Product Team (IPT) support. FY 2019 Base Plans: Will continue Government program management, systems engineering, and Integrated Product Team (IPT) support. FY 2018 to FY 2019 Increase/Decrease Statement: Increase to account for inflation and slight team shifts.	1.216	1.123	1.216	-	1.216
Title: NBCRV: Sensor Suite Upgrade Development Description: Provide Sensor suite upgrade development	16.195	-	-	-	-
Title: NBCRV Integration Support Description: Provide ILS and Integration support to the sensor suite upgrades	0.967	-	-	-	-
Title: NBCRV: Test & Evaluation	1.962	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army				Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>		Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>		
B. Accomplishments/Planned Programs (\$ in Millions)						
	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	
Description: Provide NBCRV testing of prototypes						
Title: NBCRV: Project Management						
Description: Provide NBCRV Project Management Labor						
Title: JUONS CC-0557: Part B/Initialization of Part C						
Description: Joint Urgent Operational Needs Statement (JUONS) CC-0557: Provide analysis, development and demonstration of materiel solutions to automate early warning notifications and reporting among the Forward Operating Bases and their higher headquarters /command posts. Support test to existing early warning and proximate chemical detection systems as a risk reduction means for emerging threats.						
Title: Tactical Disablement System (TacDS)						
Description: Tactical Disablement System (TacDS) will provide capabilities that delay, disrupt, degrade, and or destroy small quantities of chemical and biological warfare materiel in bulk containers and munitions in a hostile environment.						
Title: CBRN: Theater Chem Bio-Defense						
Description: CBRN Theater Chem Bio Defense efforts.						
FY 2019 Base Plans: TBD						
FY 2019 OCO Plans: TBD						
FY 2018 to FY 2019 Increase/Decrease Statement: Funding provided for CBRN Theater Chem Bio Defense effort.						
Accomplishments/Planned Programs Subtotals		43.177	7.135	22.700	1.500	24.200
C. Other Program Funding Summary (\$ in Millions)						
N/A						
Remarks						

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>	Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>

D. Acquisition Strategy

Acquisition Strategy:

Screening Obscuration Module (SOM): The SOM acquisition strategy is a single-step System Integration and Development (SID) phase leading to a Milestone C production decision. A Full and Open Cost Plus Incentive Fee competitive contract will be used to develop the SOM during the SID phase. Fixed Price Incentive (Successive Targets) options for production will be included in the contract. The acquisition strategy includes system development and demonstration, full system integration, design for producibility and demonstration of interoperability, safety, military utility and reliability.

Nuclear Biological Chemical Reconnaissance Vehicle Sensor Suite (NBCRVSS) Upgrade is an upgrade for the Stryker Nuclear Biological Chemical Reconnaissance Vehicle. The contract approach of the Chemical Surface Detector (CSD) will be a Full and Open Cost Plus Fixed Fee competitive prototyping contract. After the TMRR phase, the contract approach for CSD will be a Full and Open Cost Plus Incentive Fee Engineering Manufacturing Development contract with Fixed Price Incentive Fee options for Low Rate Initial Production and Full Rate Production.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>	Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
SOM-Project Management Personnel	MIPR	JPM NBC CA : Edgewood, MD	6.755	1.216	Nov 2016	1.123	Nov 2017	1.216	Nov 2018	-		1.216	Continuing	Continuing	Continuing
NBCRV-Project Management Personnel	MIPR	JPM NBC CA & JPEO CBD : Edgewood, MD	1.876	1.991	Nov 2016	-		-		-		-	0.000	3.867	-
Subtotal			8.631	3.207		1.123		1.216		-		1.216	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
SOM Product Development	C/CPIF	L3 : Melbourne, FL	22.761	5.289	Oct 2016	4.400	Feb 2018	2.049	Feb 2019	-		2.049	Continuing	Continuing	Continuing
NBCRV: Product Development (CSD)	C/CPIF	FLIR : Elkridge, MD	-	3.852	Feb 2017	-		-		-		-	0.000	3.852	Continuing
NBCRV: Product Development (CSD)	C/CPIF	UTC Areospace : Pomona, CA	-	2.922	Feb 2017	-		-		-		-	0.000	2.922	-
NBCRV: Product Development (CSD)	C/CPIF	L3 Sonoma : Santa Rosa, CA	-	8.964	Feb 2017	-		-		-		-	0.000	8.964	-
NBCRV: NBCSPG	Option/CPFF	CACI : Lorton, VA	-	0.457	Feb 2017	-		-		-		-	0.000	0.457	-
JUONS CC-0557	MIPR	various : various	-	4.970	Jun 2017	-		-		-		-	0.000	4.970	-
TaDS	MIPR	various : various	-	3.640	Jun 2017	-		-		-		-	0.000	3.640	-
CBRN-Theater Chem Bio Defense	TBD	TBD : TBD	-	-		-		16.600	Mar 2019	1.500	Mar 2019	18.100	0.000	18.100	-
Subtotal			22.761	30.094		4.400		18.649		1.500		20.149	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army													Date: February 2018		
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
2040 / 4				PE 0603627A / Smoke, Obscurity and Target Defeating Sys AD					E79 / SMOKE/OBSCURANT SYSTEM						
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
NBCRV ILS	MIPR	ECBC : Edgewood, MD	-	0.967	Nov 2016	-		-		-		-	0.000	0.967	-
Subtotal			-	0.967		-		-		-		-	0.000	0.967	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
SOM Test, Evaluation & OGA's	MIPR	Various OGA : Various	1.643	0.620	Dec 2016	1.612		2.835	Nov 2018	-		2.835	Continuing	Continuing	Continuing
NBCRV-Test, Evaluation & OGA's	MIPR	OGA : Various	0.571	1.962	Jan 2017	-		-		-		-	0.000	2.533	-
JUONS CC-0557	MIPR	various : various	-	6.327	Jun 2017	-		-		-		-	0.000	6.327	-
Subtotal			2.214	8.909		1.612		2.835		-		2.835	Continuing	Continuing	N/A
Project Cost Totals			33.606	43.177		7.135		22.700		1.500		24.200	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity
2040 / 4

R-1 Program Element (Number/Name)
PE 0603627A / *Smoke, Obscurity and Target Defeating Sys AD*

Project (Number/Name)
E79 / *SMOKE/OBSCURANT SYSTEM*

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
SOM Design and Fabrication	[Blue bar]																															
SOM Developmental Testing #1	[Pink bar]																															
SOM Developmental Testing #2	[Pink bar]																[Blue bar]															
SOM User Testing	[Pink bar]																								[Blue bar]							
SOM MS C	[Pink bar]																								[Blue bar]							
SOM Production Award	[Pink bar]																								[Blue bar]							
SOM FAT	[Pink bar]																								[Blue bar]							
NBCRV: NGCD 3M Design and Fabrication	[Blue bar]																															
NBCRV: Chemical Surface Detector (CSD) Award (SID)	[Blue bar]																															
NBCRV: CSD Design and Fabrication (FY18 forward Under 65503)	[Blue bar]																															
NBCRV: NGCD 3M Testing	[Blue bar]																															
NBCRV: CSD Developmental Testing	[Blue bar]																															
NBCRV: NGCD 3M Maturation	[Blue bar]								[Blue bar]																							

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>	Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023																			
	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																
NBCRV: CSD Milestone B																													■															
NBCRV: CSD Maturation																													■															
NBCRV: NGCD 3M PQT																													■															
NBCRV: CSD Production Qualification Testing (PQT)																													■															
NBCRV: CSD Low Rate Initial Production (LRIP)																													■															
NBCRV: NGCD 3M LRIP																													■															

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>	Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SOM Design and Fabrication	4	2016	1	2019
SOM Developmental Testing #1	1	2018	2	2018
SOM Developmental Testing #2	1	2019	4	2019
SOM User Testing	4	2019	4	2019
SOM MS C	3	2020	3	2020
SOM Production Award	3	2020	3	2020
SOM FAT	1	2021	1	2021
NBCRV: Next Generation Chemical Detector Mounted (NGCD 3M) Award	2	2016	2	2016
NBCRV: NGCD 3M Design and Fabrication	2	2016	2	2017
NBCRV: JSLSCAD Modeling and Simulation Award	4	2016	4	2016
NBCRV: Chemical Surface Detector (CSD) Award (SID)	1	2017	1	2017
NBCRV: CSD Design and Fabrication (FY18 forward Under 655038 EQ7)	1	2017	3	2018
NBCRV: NGCD 3M Testing	2	2017	3	2017
NBCRV: CSD Developmental Testing	3	2017	4	2018
NBCRV: NGCD 3M Maturation	1	2018	2	2020
NBCRV: CSD Milestone B	4	2018	4	2018
NBCRV: CSD Maturation	1	2019	2	2020
NBCRV: NGCD 3M PQT	4	2019	1	2020
NBCRV: CSD Production Qualification Testing (PQT)	3	2020	1	2021
NBCRV: CSD Low Rate Initial Production (LRIP)	1	2022	2	2022
NBCRV: NGCD 3M LRIP	1	2023	2	2023

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603627A / <i>Smoke, Obscurity and Target Defeating Sys AD</i>	Project (Number/Name) E79 / <i>SMOKE/OBSCURANT SYSTEM</i>

Note
Starting in FY18 all NBCRV funds moved to 655038 EQ7

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development
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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	-	47.745	41.452	41.974	-	41.974	43.272	24.428	21.910	24.502	Continuing	Continuing
694: Medium Caliber Ammunition	-	10.087	1.000	1.484	-	1.484	0.989	0.000	0.000	0.000	0.000	13.560
EB8: OWL for Small Caliber Ammunition	-	2.275	1.200	2.177	-	2.177	1.977	0.000	0.000	0.000	0.000	7.629
EB9: Aviation Airborne Expandable Countermeasures	-	3.469	1.000	2.474	-	2.474	1.186	0.000	0.000	0.000	0.000	8.129
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	0.000	3.760	-	3.760	6.821	0.000	0.000	0.000	0.000	10.581
EC3: Ammunition Logistics Prototyping	-	1.940	1.677	1.315	-	1.315	1.507	1.695	2.145	1.778	0.000	12.057
EL7: Reduced Range Ammunition	-	1.314	7.600	7.618	-	7.618	0.000	0.000	0.000	0.000	0.000	16.532
EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	-	1.807	2.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.307
EU1: Enhanced Lethality Cannon Munitions	-	9.486	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.486
EU2: Improved Multi-Option Fuze (iMOFA/iMOFM)	-	7.588	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.588
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)*	-	0.000	0.000	0.000	-	0.000	4.201	0.000	0.000	0.000	0.000	4.201
FA5: Assured Precision Weapons and Munitions	-	9.779	13.000	14.340	-	14.340	11.862	7.907	0.000	0.000	0.000	56.888
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.000	1.000	4.947	-	4.947	8.897	14.826	19.765	22.724	Continuing	Continuing
XT5: 30mm Anti-Personnel and Counter UAS	-	0.000	2.475	3.859	-	3.859	5.832	0.000	0.000	0.000	0.000	12.166

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>
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A. Mission Description and Budget Item Justification

The Tank and Medium Caliber Ammunition Program Element (PE) encompasses a comprehensive program to develop, rapidly transition to production, and field advanced weapons and munitions. These projects will ensure continued battlefield overmatch and lethality of U.S. maneuver forces against the full range of modern battlefield threats. To achieve this, the Tank and Medium Caliber Ammunition Program will identify and develop promising technologies through competitive development and streamlined acquisition procedures.

Project 694: 30x113mm Linked Ammunition: Develop and qualify 30x113mm linked ammunition for ground vehicles by increasing precision and lethality capability to defeat personnel and materiel targets as well as the Joint Urgent Operational Need to counter the rapidly evolving threat of Unmanned Aerial Systems. This effort will qualify the links for use in existing M788 and M789 ammunition and develop airburst capable munitions fired from the Lightweight 30x113mm Link Fed Chain Gun. FY 2019 funds will be used to purchase links and linked ammunition, conduct weapon system integration, testing and evaluation, and support the Urgent Materiel Release (UMR) of the 30x113mm weapon system.

High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the Capability Development Document (CDD), 40mm Low Velocity (LV) Family of Ammunition Annex. The 40mm LV HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M203/M320 Grenade Launchers. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions at increased effective ranges with greater accuracy and lethality. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel at increased ranges beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges increasing Soldier Survivability.

The 30x173mm Programmable Airburst Munitions - Tracer (PABM-T) Urgent Materiel Release (UMR) program funds the qualification and procurement of a PABM-T cartridge for rapid fielding in support of the Stryker Operational Needs Statement (ONS) for Increased Lethality. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV). The cartridge will provide an airburst capability with increased effectiveness against personnel in the open and in defilade over the current tactical solutions.

Project EB8: The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62mm and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 caliber munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL project's objective is to develop and field a full day/night tracer round to replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability. 7.62mm is the immediate focus followed by 5.56mm and .50 caliber cartridges. FY 2019 funding supports continued testing and evaluation of the 5.56mm prototype solutions in order to attain a Technology Level Readiness (TRL) of 6 in FY 2020.

Project EB9: This project is to support the advanced development activities and technology demonstrations of the Aviation Airborne Expendable Countermeasure (AAECM). These advanced decoys are necessary to address emerging threats and capabilities deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. These efforts will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will help expedite technology transition from the laboratory

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<p>to operational use by demonstrating component and subsystem maturity prior to integration into major and complex Army aircraft platforms. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army RDT&E efforts are coordinated with the PEO Aviation and its platform PMs with PM Aircraft Survivability Equipment (ASE) to address emerging Joint Urgent Operational Needs Statement (JUONS) from theatre. Continue to develop and prepare documentation for Milestone A decision for the Radar Guided decoy. This decoy is designed to defeat specific threat types. Details of their operation is classified. Conduct initial developmental/operational testing on Cloud CM.</p> <p>Project EC2: The Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62mm and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The FY 2019 funding focuses on calibers below 7.62mm. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. This project is a New Start FY 2019.</p> <p>Project EC3: This Project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This Project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. FY 2019 funding will be used to complete verification testing and an operational demonstration for the environmental health monitoring system. FY 2019 funding will also continue verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability, and continue the maturation of the design and fabrication of prototype plastic polymer rectangular containers for developmental 5.56mm ammunition.</p> <p>Project EL7: The small caliber Reduced Range Ammunition (RRA) project is a critical technology development in response to the 7.62mm and .50 caliber Capabilities Development Documents (CDD). The overall objective of RRA is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. RRA will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The RRA cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. FY 2019 funding will support Milestone (MS) B activities to include Request for Proposal (RFP), Preliminary Design Review (PDR) and Engineering and Manufacturing Development (EMD) contract award. Funding will also explore lessons learned from the United States Marine Corp (USMC) .50 Caliber Reduced Range Ammunition effort and other various options to satisfy the .50 Caliber reduced range requirement.</p> <p>Project EL8: The Lightweight Small Caliber Ammunition (LSCA) Project is a critical technology development in response to the 7.62mm Capabilities Development Documents (CDD). The goal of the LSCA Project is to reduce the total Soldier load through reduction in ammunition weight. The LSCA Project will develop and field 7.62mm LSCA cartridges that will provide the same capabilities as the M80A1 and M62A1 cartridges. The LSCA cartridge will be designed to be compatible with all Army 7.62mm weapon systems, but optimized to work in the M240 Machine Gun.</p>		

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<p>Project EU1: The Enhanced Lethality Cannon Munitions (ELCM) project evaluates, develops, matures, and demonstrates new lethality technologies for 155mm cannon artillery munitions and evaluates their effectiveness in mitigating evolving and derived capability gaps, and support transition to Engineering Manufacturing Development (EMD). The ELCM project prototypes and accelerates the maturation of enhanced lethality technologies, such as Lithographic Fragmentation Technology (LFT) or pre-formed fragmentation, for 155mm cannon artillery munitions. The ELCM project accelerates the development and maturation of LFT for subsequent integration on the 155mm XM1128 high explosive projectile per HQDA G-8 Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition, 22 December 2016. ELCM also supports prototyping of enhanced lethality technologies applicable to 155mm cannon artillery munitions, including prototyping of projectile design, explosive formulations, fragmentation, and software for the 155mm XM1113 effort, which is a potential long-range cannon projectile that will increase range by 10km or greater and contain twice as much rocket motor grains as the current 155mm long range cannon projectile that is now obsolete. The design requires increased lethality since the projectile contains a reduced amount of explosive to make room for the increased amount of rocket motor grains required for increased range. ELCM addresses requirements for increased lethality above the current U.S. Army go-to-war 155mm high explosive unitary projectiles, the M795 Insensitive Munition and obsolete M549A1 Unitary Munition.</p> <p>Project EU2: The Improved Multi-Option Fuze (iMOFA/iMOFM) project will identify, develop, prototype, and demonstrate new improved multi-option fuze technologies, components, and subsystems based on Government-owned Next Generation Proximity Sensor (NGPS) capabilities with built-in exportability attributes previously matured via OSD sponsored tech base efforts under the Joint Fuze Technology Program and Defense Exportability Features (DEF) Congressional Pilot Program. This project will support technology maturation and risk reduction, and will evaluate and analyze producibility, affordability, safety, and compatibility of these prototype potential materiel solutions in representative realistic performance-related developmental tests. This project will enable fact-based analysis of new Government-owned height of burst/proximity fuzing alternatives that are resistant to enemy countermeasures and reverse engineering threats, quantify their effectiveness, reduce integration risk, and support transition into existing/new artillery/mortar fuzes and munitions.</p> <p>Project FA5: The Assured Precision Weapons and Munitions (APWM) project is a continuation of efforts initiated under 644120A-ED5. The objective of this advanced risk mitigation, prototyping and product support effort is to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems in a system of systems environment. The APWM efforts directly support three of the Chief of Staff of the Army's (CSA) "Big 6" Modernization Priorities. Specifically, they support; Long Range Precision Fires, Network/C3I (incl Assured PNT), and Soldier Lethality. The APWM project will enable increased lethality and ensure future battlefield success against peer/near-peer adversaries by supporting these Modernization Priorities. Current and evolving threats to existing Positioning, Navigation, and Timing (PNT) capabilities have created the need for new/emerging Assured PNT capabilities (including M-Code GPS and Pseudolites) into both Munitions and Weapons operating in a complex system-of-systems environment. This imperative is reinforced by Public Law 111-383 Section 913 which mandates the use of Air Force-developed M-Code GPS capabilities in all systems fielded FY2018 and beyond unless a waiver is obtained from the Secretary of Defense. As such, both precision weapon and munition programs must coordinate with the development and technology delivery activities of the Air Force's Military GPS User Equipment (MGUE) program and the Army's Assured PNT program to protect and insure critical precision-based Joint warfighting capabilities as well as maximizing effectiveness and efficiency of US taxpayer investments. FY 2019 funding will support the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment,</p>		

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>
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configuration management of the evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions, and specific support focus includes requirements for MGUE Increment 2, Pseudolites (PL), and Alternative Navigation (AltNav) related technology maturity for Assured PNT milestone decisions.

Project FG1: The Cannon-Delivered Area Effects Munitions (C-DAEM) Project will analyze, identify, develop, prototype, and demonstrate 155mm Cannon Artillery munition area effects capability. C-DAEM are envisioned as a suite of 155mm artillery munitions, to provide U.S. ground forces with a capability to effectively engage area targets to destroy, neutralize and/or suppress threat platforms and facilities, and deny threat forces full operational freedom within the targeted area. Initial objective values for C-DAEM would meet Dual Purpose Improved Conventional Munition (DPICM) effects capabilities against personnel and light vehicles and exceed DPICM effects capabilities against armor. An Analysis of Alternatives (AoA) will be completed to best inform necessary area effect lethality requirements. The Project addresses requirements from the U.S. Army adopted U.S. Marine Corps (USMC) C-DAEM Initial Capabilities Document (ICD) [Army Requirements Oversight Council (AROC) adopted 20 October 2016, Joint Requirements Oversight Council (JROC) approved 11 May 2016]. The approved C-DAEM ICD as an Army requirement is located in the Capabilities and Army Requirements Documents number 0438. The Joint Staffing Designator is JROC Interest. FY 2019 will support the preparation and evaluation of the Request for Proposals (RFP) for technologies and capabilities identified through the AoA, as well as the development of the Capabilities Development Document (CDD) for each technology.

Project XT5: Lightweight 30mmx113mm (LW30) Airburst is a new capability identified as a Warfighter requirement in the Capability Production Document (CPD), AH-64E Helicopter, Increment 1, Version 6. The LW30 airburst cartridge improves the ability of the warfighter to effectively engage anti-personnel/materiel targets due to increased lethality. Airburst capability provides the user a much higher probability of achieving a first burst kill against enemy personnel targets in the open. The LW30 will retain its dual purpose warhead, allowing it to continue to defeat light armored threats through point detonation. The cartridge provides increased lethal effects against personnel & soft-skin vehicular targets increasing Soldier Survivability on the ground during troops in contact engagements and decreases the required number of rounds to reach the desired lethal effects. FY 2019 continues to support the Technology Maturation and Risk Reduction effort.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	42.096	41.452	42.209	-	42.209
Current President's Budget	47.745	41.452	41.974	-	41.974
Total Adjustments	5.649	0.000	-0.235	-	-0.235
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	8.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.351	-			
• Adjustments to Budget Years	-	-	-0.235	-	-0.235

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Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 694: *Medium Caliber Ammunition*

Congressional Add: *Safety Confirmation and Qualification in support of Stryker ICV Urgent Material Release (UMR)*

Congressional Add Subtotals for Project: 694

Congressional Add Totals for all Projects

	FY 2017	FY 2018
	8.000	-
	8.000	-
	8.000	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>					Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>		
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
694: <i>Medium Caliber Ammunition</i>	-	10.087	1.000	1.484	-	1.484	0.989	0.000	0.000	0.000	0.000	13.560
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Element (PE) 0603639A, Project 694, Medium Caliber Ammunition funds the 40mm Low Velocity High Explosive Air Burst (HEAB) XM1166, 30mm Stryker Infantry Carrier Vehicle (ICV) Lethality efforts in FY 2017, and the 30x113mm ammunition improvements for ground vehicle platform efforts beginning in FY 2018. In FY 2018, PE 0603639A, Project 694, HEAB XM1166 will transition to Budget Activity 5 (BA5) PE 0604802A, Project EW1, 40mm Low Velocity Ammunition.

A. Mission Description and Budget Item Justification

30x113mm Linked Ammunition: Develop and qualify 30x113mm linked ammunition for ground vehicles by increasing precision and lethality capability to defeat personnel and materiel targets as well as the Joint Urgent Operational Need to counter the rapidly evolving threat of Unmanned Aerial Systems. This effort will qualify the links for use in existing M788 and M789 ammunition and develop airburst capable munitions fired from the Lightweight 30x113mm Link Fed Chain Gun. FY 2019 funds will be used to purchase links and linked ammunition, conduct weapon system integration, testing and evaluation, and support the Urgent Materiel Release (UMR) of the 30x113mm weapon system.

High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the Capability Development Document (CDD), 40mm Low Velocity (LV) Family of Ammunition Annex. The 40mm LV HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M203/M320 Grenade Launchers. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions at increased effective ranges with greater accuracy and lethality. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel at increased ranges beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges increasing Soldier Survivability.

The 30x173mm Programmable Airburst Munitions - Tracer (PABM-T) Urgent Materiel Release (UMR) program funds the qualification and procurement of a PABM-T cartridge for rapid fielding in support of the Stryker Operational Needs Statement (ONS) for Increased Lethality. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV). The cartridge will provide an airburst capability with increased effectiveness against personnel in the open and in defilade over the current tactical solutions.

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

	FY 2017	FY 2018	FY 2019
Title: Linked 30x113mm Ammunition Qualification for New Weapon and Vehicle Applications	-	1.000	1.484
Description: Linked 30x113mm Ammunition Qualification for New Weapon and Vehicle Applications			
FY 2018 Plans:			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
FY 2018 funds are required to update linked 30x113mm ammunition Technical Data Packages (TDPs), purchase ammunition links, and contract to link M788 and M789 cartridges. Linked ammunition deliveries will be synchronized to support ammunition/link/weapon qualification activities.			
FY 2019 Plans: FY 2019 funds will be used to purchase links and linked ammunition, conduct weapon system integration, testing and evaluation, and support the Urgent Materiel Release (UMR) of the 30x113mm weapon system.			
FY 2018 to FY 2019 Increase/Decrease Statement: FY 2018 new start for 30x113mm linked ammunition. FY 2019 planned continuation technology maturation of the 30x113mm linked ammunition and support UMR.			
Title: Pre Engineering Manufacturing Development Activities for the 40mm HEAB XM1166	2.087	-	-
Description: Pre-award activities need to be accomplished prior to start of EMD.			
Accomplishments/Planned Programs Subtotals	2.087	1.000	1.484

	FY 2017	FY 2018
Congressional Add: Safety Confirmation and Qualification in support of Stryker ICV Urgent Material Release (UMR)	8.000	-
FY 2017 Accomplishments: N/A		
Congressional Adds Subtotals	8.000	-

C. Other Program Funding Summary (\$ in Millions)											Cost To	
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Complete	Total Cost	
• FA6: 30mm Lethality	-	12.000	13.851	-	13.851	8.897	11.860	6.918	-	Continuing	Continuing	
• EW1: 40mm Low Velocity Ammunition	-	9.678	13.269	-	13.269	14.032	21.302	1.482	-	0.000	59.763	

Remarks
40mm High Explosive Air Burst (HEAB), XM1166, effort transitions to Program Element (PE) 0604802A, Project EW1, in FY 2018. The Stryker 30mm Programmable Airburst Munitions lethality effort transitions from PE 0603639A, Project 694, to PE0604802A, Project FA6, in FY 2018.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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D. Acquisition Strategy

30x113mm Linked Ammunition: An existing Indefinite Delivery/Indefinite Quantity (IDIQ) contract will be used to purchase links for the 30x113mm ammunition. Linked ammunition deliveries will be synchronized with test schedules for ammunition/weapon qualification and Remote Weapon Station (RWS)/vehicle system integration. Ammunition qualification tests and weapon qualification tests will begin in FY 2019. Purchase of linked M788 and M789 cartridges will transition to competitive procurement by FY 2021. Preparatory activities for initial efforts to develop an airburst capable munition will also be conducted.

40mm Low Velocity High Explosive Airburst (HEAB): The HEAB cartridge will be developed through a competitive Engineering and Manufacturing Development (EMD) program. As part of the pre-EMD activities, Cooperative Research and Development Agreement (CRADA) Testing with contractors will occur to evaluate potential designs. For EMD, two Full and Open competitive contracts will be awarded. After Developmental Test & Evaluation (DT&E) the government will down-select to a single contractor for Low Rate Initial Production (LRIP) and two production year options.

Stryker 30x173mm Programmable Airburst Munitions-Tracer (PABM-T): A contract will be awarded to purchase MK310 MOD 0 PABM-T (Programmable Air Burst with Tracer) cartridges in support of Safety Confirmation Testing. A follow on production contract will be awarded for rapid fielding in support of the Urgent Materiel Release (UMR).

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
40mm High Explosive Air Burst XM1166 Program Manager Maneuver Ammunition Systems (PM MAS)	MIPR	Picatinny Arsenal, NJ : Picatinny Arsenal, NJ	-	0.200		-		-		-		-	Continuing	Continuing	Continuing
30x173mm Stryker Ammo Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal, NJ : Picatinny Arsenal, NJ	-	0.100		-		-		-		-	0.000	0.100	-
30x113 Ammo Links and Linking Contract	Option/ IDIQ	TBD : TBD	-	-		0.600		1.084		-		1.084	Continuing	Continuing	Continuing
30x173mm Stryker Ammo Contract	Option/ FFP	Orbital ATK : Plymouth, MN	-	7.500		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			-	7.800		0.600		1.084		-		1.084	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
40mm HEAB XM1166 Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	1.377		-		-		-		-	Continuing	Continuing	Continuing
30x113 Linked Ammo Armament Research Development and Engineering Center (ARDEC)	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	-		0.400		0.400		-		0.400	Continuing	Continuing	Continuing
30X173mm Stryker Ammo Armament Research Development and Engineering Center (ARDEC)	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	0.400		-		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
40mm HEAB Communications-Electronics Research Development and Engineering Center (CERDEC)	MIPR	Communications-Electronics Research Development and Engineering Center (CERDEC) : Aberdeen Proving Grounds, MD	-	0.148		-		-		-		-	0.000	0.148	-
40mm HEAB Army Materiel Systems Analysis Activity (AMSAA)	MIPR	Army Materiel Systems Analysis Activity (AMSAA) : Aberdeen Proving Grounds, MD	-	0.080		-		-		-		-	0.000	0.080	-
Subtotal			-	2.005		0.400		0.400		-		0.400	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
40mm HEAB XM1166 Aberdeen Test Center (ATC) - CRADA	MIPR	ATC : Aberdeen, MD	-	0.282		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			-	0.282		-		-		-		-	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	-	10.087	1.000	1.484	-	1.484	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
40mm HEAB XM1166 CRADA Testing	[Redacted]				40mm HEAB XM1166 Testing																							
40mm HEAB XM1166 Milestone B									4																			
40mm HEAB XM1166 Engineering Manufacturing Development					40mm HEAB XM1166 MS-B																							
40mm HEAB XM1166 Engineering Manufacturing Development					40mm HEAB XM1166 EMD																							
40mm HEAB XM1166 Engineering Manufacturing Development Contract Award					5																							
40mm HEAB XM1166 Preliminary Design Review					40mm HEAB XM1166 EMD AWARD																							
40mm HEAB XM1166 Test Readiness Review DET I					6																							
40mm HEAB XM1166 Design Engineering Test DET I					40mm HEAB XM1166 PDR																							
40mm HEAB XM1166 Test Readiness Review DET 2					8																							
40mm HEAB XM1166 Design Engineering Test DET 2					40mm HEAB XM1166 TRR DET 1																							
40mm HEAB XM1166 Test Readiness Review DET 3					40mm HEAB XM1166 DET 1																							
40mm HEAB XM1166 Design Engineering Test DET 3					10																							
40mm HEAB XM1166 Critical Design Review					40mm HEAB XM1166 TRR DET 2																							
40mm HEAB XM1166 Test Readiness Review DT&E					40mm HEAB XM1166 DET 2																							
					12																							
					40mm HEAB XM1166 TRR DET 3																							
					40mm HEAB XM1166 DET 3																							
					13																							
					40mm HEAB XM1166 CDR																							
					14																							
					40mm HEAB XM1166 TRR DT&E																							



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
40mm HEAB XM1166 Developmental Test & Evaluation																	██████████				40mm HEAB XM1166 DT&E											
40mm HEAB XM1166 Milestone C																																
40mm HEAB XM1166 Low Rate Initial Production																																
30x113mm Linked Ammo Request for Proposals (RFP) Release																																
30x113mm Linked Ammo Contract Award																																
30x113mm Linked Ammo Linking and Manufacturing																																
30x113mm Linked Ammo Qualification Testing																																
30x113mm Linked Ammo Safety Confirmation																																
30x113mm Linked Ammo for Weapon Qualification Testing																																
30x113mm Linked Ammo Weapon Safety Confirmation																																
Stryker 30x173mm PABM UMR Contract Award																																
Stryker 30x173mm PABM UMR Safety Qualification Build																																
Stryker 30x173mm PABM UMR Safety Qualification Test																																

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Stryker 30x173mm PABM UMR Live Fire Test and Evaluation									 Stryker PABM UMR LFT&E																			
Stryker 30x173mm PABM UMR Urgent Materiel Release									 Stryker PABM UMR Materiel Release																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
40mm HEAB XM1166 CRADA Testing	3	2017	1	2018
40mm HEAB XM1166 Milestone B	3	2018	3	2018
40mm HEAB XM1166 Engineering Manufacturing Development	3	2018	1	2022
40mm HEAB XM1166 Engineering Manufacturing Development Contract Award	4	2018	4	2018
40mm HEAB XM1166 Preliminary Design Review	2	2019	2	2019
40mm HEAB XM1166 Test Readiness Review DET I	3	2019	3	2019
40mm HEAB XM1166 Design Engineering Test DET I	4	2019	4	2019
40mm HEAB XM1166 Test Readiness Review DET 2	2	2020	2	2020
40mm HEAB XM1166 Design Engineering Test DET 2	2	2020	3	2020
40mm HEAB XM1166 Test Readiness Review DET 3	1	2021	1	2021
40mm HEAB XM1166 Design Engineering Test DET 3	1	2021	2	2021
40mm HEAB XM1166 Critical Design Review	3	2021	3	2021
40mm HEAB XM1166 Test Readiness Review DT&E	4	2021	4	2021
40mm HEAB XM1166 Developmental Test & Evaluation	4	2021	2	2022
40mm HEAB XM1166 Milestone C	3	2022	3	2022
40mm HEAB XM1166 Low Rate Initial Production	3	2022	3	2023
30x113mm Linked Ammo Request for Proposals (RFP) Release	1	2018	1	2018
30x113mm Linked Ammo Contract Award	2	2018	2	2018
30x113mm Linked Ammo Linking and Manufacturing	2	2018	4	2018
30x113mm Linked Ammo Qualification Testing	1	2019	4	2019
30x113mm Linked Ammo Safety Confirmation	4	2019	4	2019
30x113mm Linked Ammo for Weapon Qualification Testing	1	2019	3	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
30x113mm Linked Ammo Weapon Safety Confirmation	3	2020	3	2020
Stryker 30x173mm PABM UMR Contract Award	4	2017	4	2017
Stryker 30x173mm PABM UMR Safety Qualification Build	4	2017	3	2018
Stryker 30x173mm PABM UMR Safety Qualification Test	3	2018	4	2018
Stryker 30x173mm PABM UMR Live Fire Test and Evaluation	2	2019	2	2019
Stryker 30x173mm PABM UMR Urgent Materiel Release	3	2019	3	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>				Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</i>			
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
EB8: <i>OWL for Small Caliber Ammunition</i>	-	2.275	1.200	2.177	-	2.177	1.977	0.000	0.000	0.000	0.000	7.629
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber One Way Luminescence (OWL) technology applies to multiple calibers. In FY 2018, Program Element (PE) 0603639A, Project EB8, 7.62mm OWL will transition to Budget Activity 5 (BA5) PE 0604802A, Project EP4, 7.62mm OWL; the project is not a new start. OWL develops a new tracer technology and applies it to multiple calibers. The initial focus was on 7.62mm ammunition in FY 2015 followed by 5.56mm in FY 2018. As the technology matures the project transitions to PE/ Project 0604802A EP4 starting in FY 2018 for 7.62mm, and FY 2021 for 5.56mm. The OWL cartridge will be compatible with all Army Small Caliber weapon systems, but optimized for Machine Guns and will provide improved lethality/target effects over the current tracer munition.

A. Mission Description and Budget Item Justification

The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62mm and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 caliber munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL project's objective is to develop and field a full day/night tracer round to replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability. 7.62mm is the immediate focus followed by 5.56mm and .50 caliber cartridges. FY 2019 funding supports continued testing and evaluation of the 5.56mm prototype solutions in order to attain a Technology Level Readiness (TRL) of 6 in FY 2020.

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

	FY 2017	FY 2018	FY 2019
Title: Technology Maturation and Risk Reduction (TMRR)	2.275	1.200	2.177
Description: One Way Luminescence (OWL) will develop and demonstrate a full day/night tracer technology that eliminates the shortcomings of current legacy tracers.			
FY 2018 Plans: The 7.62mm efforts include maturing the multiple design concepts and Technology Readiness Level (TRL) to TRL 6. The 7.62mm effort will down-select to one design from multiple competing prototype solutions to begin EMD. FY 2018 efforts include activities to mature 5.56mm TRL and includes development, procurement, and testing of multiple competing prototype solutions to reduce risk in meeting user requirements. Funding also supports the exploration of .50 caliber technology.			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
FY 2019 efforts will continue activities to mature 5.56mm Technology Readiness Level (TRL). The 5.56mm efforts include development, procurement, and testing of multiple competing prototype solutions to reduce risk in meeting user requirements. Funding will also support the exploration of .50 caliber technology.			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Technology maturation of the 5.56mm OWL starts in FY 2018. The FY 2019 funding furthers the development of the 5.56mm OWL technology.			
Accomplishments/Planned Programs Subtotals	2.275	1.200	2.177

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
• EP4: <i>One-Way Luminescence for Small Caliber Ammo</i>	-	2.688	6.085	-	6.085	6.472	12.247	5.324	6.422	0.000	39.238

Remarks
The OWL technology will be integrated into the M80A1 trace ammunition production. Budget Activity (BA5) Program Element (PE) 0604802A, Project EP4, OWL for Small Caliber Ammunition project is not a new start and the FY 2019 funding continues the development work of 7.62mm OWL cartridges into Engineering and Manufacturing Development (EMD). EMD activities in support of the 5.56mm cartridges begin in FY 2021.

D. Acquisition Strategy
The OWL concept will be developed through Government and Industry prototyping efforts. A Technology Readiness Assessment (TRA) was conducted in FY 2015 and FY 2016 to measure the progress of the designs. The FY 2017 TRA was conducted to evaluate the Industry and Government concepts in order to proceed with the 7.62mm Engineering and Manufacturing Development (EMD) in FY 2018. The 5.56mm and .50 caliber cartridges will follow the 7.62mm schedule with Engineering and Manufacturing Development (EMD) starting in FY 2021. The new 5.56mm tracer cartridges will replace the legacy 5.56mm M856A1 tracer.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development				EB8 / OWL for Small Caliber Ammunition							
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Manager Maneuver Ammunition Systems (PM MAS) - Labor & Travel	Various	Picatinny Arsenal : New Jersey	0.360	0.010		0.200		0.025		-		0.025	Continuing	Continuing	Continuing
Physical Optics Corporation	C/FFP	Torrance : California	1.005	0.075		-		-		-		-	0.000	1.080	-
Battelle Memorial Institute	C/FFP	Columbus : Ohio	0.611	0.105		-		-		-		-	0.000	0.716	-
Tooling	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.209		-		0.477		-		0.477	0.000	0.686	-
Subtotal			1.976	0.399		0.200		0.502		-		0.502	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	1.719	1.550		1.000		1.350		-		1.350	Continuing	Continuing	Continuing
Subtotal			1.719	1.550		1.000		1.350		-		1.350	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	0.200	0.078		-		0.040		-		0.040	Continuing	Continuing	Continuing
Army Corps of Engineers	MIPR	Vicksburg : Missouri	0.260	0.053		-		0.110		-		0.110	Continuing	Continuing	Continuing
Night Vision Labs (NVL)	MIPR	Fort Belvoir : Virginia	0.040	-		-		0.075		-		0.075	Continuing	Continuing	Continuing

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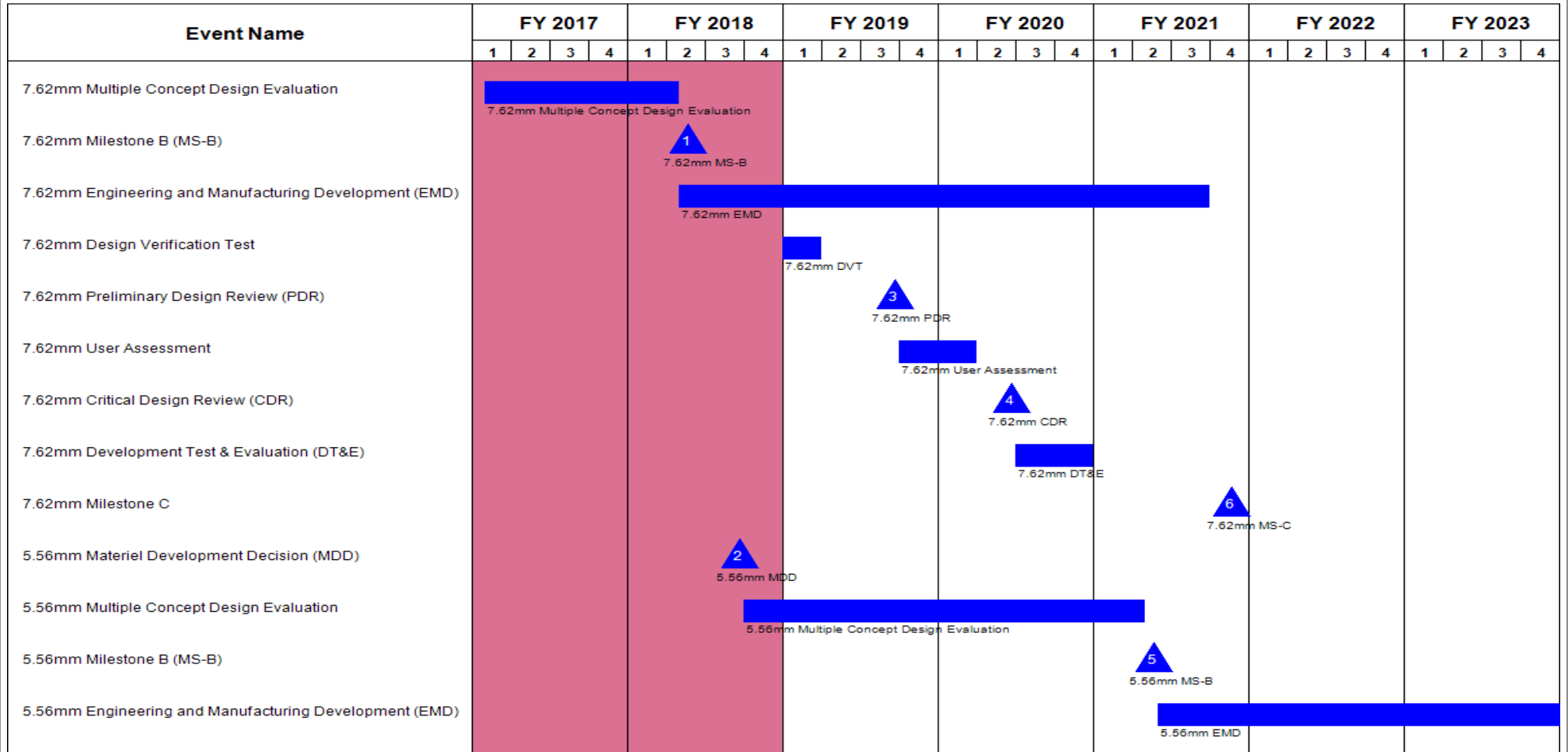
Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018		
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EB8 / OWL for Small Caliber Ammunition					

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	0.101		-		0.100		-		0.100	Continuing	Continuing	Continuing
Army Joint Munitions Command	MIPR	Rock Island : Illinois	0.060	0.094		-		-		-		-	0.000	0.154	-
Naval Air Warfare Center	MIPR	Patuxent River : Maryland	0.137	-		-		-		-		-	0.000	0.137	-
Subtotal			0.697	0.326		-		0.325		-		0.325	Continuing	Continuing	N/A
Project Cost Totals			4.392	2.275		1.200		2.177		-		2.177	Continuing	Continuing	N/A

Remarks

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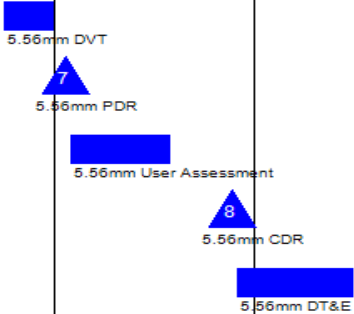
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</i>



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023																							
	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																				
5.56mm Design Verification Test																																																
5.56mm Preliminary Design Review (PDR)																																																
5.56mm User Assessment																																																
5.56mm Critical Design Review (CDR)																																																
5.56mm Development Test & Evaluation (DT&E)																																																



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Multiple Concept Design Evaluation	1	2015	2	2018
7.62mm Milestone B (MS-B)	2	2018	2	2018
7.62mm Engineering and Manufacturing Development (EMD)	2	2018	3	2021
7.62mm Design Verification Test	1	2019	1	2019
7.62mm Preliminary Design Review (PDR)	3	2019	3	2019
7.62mm User Assessment	4	2019	1	2020
7.62mm Critical Design Review (CDR)	2	2020	2	2020
7.62mm Development Test & Evaluation (DT&E)	3	2020	4	2020
7.62mm Milestone C	4	2021	4	2021
5.56mm Materiel Development Decision (MDD)	3	2018	3	2018
5.56mm Multiple Concept Design Evaluation	4	2018	2	2021
5.56mm Milestone B (MS-B)	2	2021	2	2021
5.56mm Engineering and Manufacturing Development (EMD)	2	2021	3	2024
5.56mm Design Verification Test	4	2021	4	2021
5.56mm Preliminary Design Review (PDR)	1	2022	1	2022
5.56mm User Assessment	1	2022	3	2022
5.56mm Critical Design Review (CDR)	4	2022	4	2022
5.56mm Development Test & Evaluation (DT&E)	4	2022	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>					Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>		
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
EB9: <i>Aviation Airborne Expandable Countermeasures</i>	-	3.469	1.000	2.474	-	2.474	1.186	0.000	0.000	0.000	0.000	8.129
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project is to support the advanced development activities and technology demonstrations of the Aviation Airborne Expendable Countermeasure (AAECM). These advanced decoys are necessary to address emerging threats and capabilities deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. These efforts will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will help expedite technology transition from the laboratory to operational use by demonstrating component and subsystem maturity prior to integration into major and complex Army aircraft platforms. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army RDT&E efforts are coordinated with the PEO Aviation and its platform Program Managers (PMs) with PM Aircraft Survivability Equipment (ASE) to address emerging Joint Urgent Operational Needs Statement (JUONS) from theatre. Continue to develop and prepare documentation for Milestone A decision for the Radar Guided decoy. This decoy is designed to defeat specific threat types. Details of their operation is classified. Conduct initial developmental/operational testing on Cloud Countermeasures (CM).

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

	FY 2017	FY 2018	FY 2019
Title: Expendable Countermeasures to Guided Missile Threats	3.469	1.000	2.474
Description: This program will develop expendable countermeasure (CM) decoys which will protect Army aircraft from surface-to-air missiles.			
FY 2018 Plans: Develop and prepare documentation for Milestone A decision for the Radar Guided decoy. This decoy is designed to defeat specific threat types. Details of their operation is classified. Initiate contract documents to support post MS A contracts for Radar Guided decoy. Execute Technology Development phase for Cloud CM. Award multiple contracts to support initial developmental/operational testing on Cloud CM.			
FY 2019 Plans: Conduct Cloud Pre-EMD Review, Preliminary Design Review (PDR) and flight testing on Cloud Countermeasures (CM) and Radio Frequency (RF) CM. Initiate documentation to support MS B for Cloud CM. Execute Technology Development phase for Radar CM. Award contract(s) to support initial developmental/operational testing on Radar Guided decoy. Conduct Systems Requirements Review on Radar CM.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
FY19 funding increased by \$1,474k for additional product development efforts.			
Accomplishments/Planned Programs Subtotals	3.469	1.000	2.474

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
• EP7: <i>EP7 - Tunable Pyrotechnic Aircraft Countermeasure Flares</i>	1.430	7.500	7.300	-	7.300	5.800	-	16.400	-	0.000	38.430

Remarks

D. Acquisition Strategy

The Acquisition strategy is for a family of countermeasure flares that will be developed in incremental phases as funding and requirements are approved. Initial countermeasure flare is the Cloud CM followed by new increments that will defeat threats outlined in the requirements documents developed by TRADOC. MDD approval was in 3QFY17

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development				EB9 / Aviation Airborne Expandable Countermeasures							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management	MIPR	PM Close Combat Systems : Picatinny Arsenal	0.340	0.115	Dec 2017	0.110	Aug 2018	0.074	Jan 2019	-		0.074	0.000	0.639	-
Subtotal			0.340	0.115		0.110		0.074		-		0.074	0.000	0.639	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Prototype Development	C/FFP	ACC : Picatinny Arsenal	0.546	1.500	Dec 2017	-		1.500	May 2019	-		1.500	0.000	3.546	-
Subtotal			0.546	1.500		-		1.500		-		1.500	0.000	3.546	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Engineering Support	MIPR	ARDEC : Picatinny Arsenal	1.126	0.593		0.250	Jan 2018	0.400	Jan 2019	-		0.400	0.000	2.369	-
Subtotal			1.126	0.593		0.250		0.400		-		0.400	0.000	2.369	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Test and Evaluation	MIPR	AED : Redstone Arsenal	0.500	0.450		0.125	Apr 2018	0.500	Apr 2019	-		0.500	0.000	1.575	-
Modeling & Simulation	MIPR	AMRDEC/ARDEC : Picatinny Arsenal	-	-		0.515	Apr 2018	-		-		-	0.000	0.515	-
AOA Development	MIPR	AMSAA : APG, MD	-	0.261	Aug 2017	-		-		-		-	0.000	0.261	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Matériel Development Documentation and Decision for Cloud CM																												
Analysis of Alternative																												
Milestone A Cloud CM									▲ 1																			
Contract preparation Cloud CM									■																			
Contract Award Cloud CM									▲ 3																			
Cloud CM prototyping and developmental testing																												
Milestone A Radar Guided threat CM									▲ 2																			
Contract Preparation for Radar Guided CM									■																			
Contract Award Radar Guided CM									▲ 4																			
Radar Guided CM Prototyping and Developmental Testing																												
Milestone B Cloud CM													▲ 5															
Milestone B Radar Guided Threat CM																	▲ 6											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Matériel Development Documentation and Decision for Cloud CM	2	2016	2	2018
Analysis of Alternative	3	2017	3	2018
Milestone A Cloud CM	4	2018	4	2018
Contract preparation Cloud CM	4	2018	1	2019
Contract Award Cloud CM	1	2019	1	2019
Cloud CM prototyping and developmental testing	3	2018	1	2020
Milestone A Radar Guided threat CM	4	2018	4	2018
Contract Preparation for Radar Guided CM	4	2018	1	2019
Contract Award Radar Guided CM	1	2019	1	2019
Radar Guided CM Prototyping and Developmental Testing	1	2019	3	2020
Milestone B Cloud CM	1	2020	1	2020
Milestone B Radar Guided Threat CM	1	2021	1	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development	Project (Number/Name) EC2 / Adv Armor-Piercing (ADVAP) for Small Cal Ammo
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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
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	0.000	3.760	-	3.760	6.821	0.000	0.000	0.000	0.000	10.581
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

The small caliber Advanced Armor-Piercing (ADVAP) technology has been under development since 2015 and applies to multiple caliber ammunition. The initial funding resided in Budget Activity 4 (BA4) PE 0603639 Project EC2. In FY 2017, the funding transitioned from the BA4 Program Element to Budget Activity 5 (BA5) PE 0604802A, Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo and continues the development of ADVAP 7.62mm ammunition. A follow-on effort to support ADVAP ammunition calibers "below 7.62mm" will commence in FY 2019 under the original BA4 PE 0603639A, Project EC2 Adv Armor-Piercing (AMMO) Small Cal Ammo. It is not a new start but is an effort to continue the development ADVAP ammunition on calibers below 7.62mm.

A. Mission Description and Budget Item Justification

The Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62mm and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The FY 2019 funding focuses on calibers below 7.62mm. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

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

	FY 2017	FY 2018	FY 2019
Title: ADVAP Ammunition Technology Maturation & Risk Reduction (TMRR)	-	-	3.760
Description: Develop, demonstrate, and qualify small caliber ADVAP cartridges that can defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.			
FY 2019 Plans: FY 2019 efforts will be focused on building and evaluating ammunition prototypes to refine concepts to mature the technology readiness level and will complete Materiel Development Decision (MDD).			
FY 2018 to FY 2019 Increase/Decrease Statement: Follow-on project beginning in FY2019 for the development of ADVAP ammunition calibers below 7.62mm.			
Accomplishments/Planned Programs Subtotals	-	-	3.760

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2019</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• EP5: <i>Adv Armor-Piercing (ADVAP) for Small Caliber Ammo</i>	12.452	11.571	21.019	-	21.019	4.783	13.953	6.918	6.446	0.000	77.142

Remarks

This funding line supports Engineering & Manufacturing Development (EMD) activities for the ADVAP ammunition. Including the development of ADVAP ammunition for the Next Generation Squad Weapon (NGSW).

D. Acquisition Strategy

The ADVAP ammunition programs will use a Government developed design and manufacturing process. Multiple component contracts will be awarded to purchase raw materials and equipment. In FY 2016, the ADVAP effort accomplished design optimization, manufactured prototypes, and demonstrated TRL 6 for XM1158. Milestone (MS) B occurred in 1st Quarter FY 2017 leading to fabrication and testing of qualification hardware for the 7.62mm cartridge. Developmental efforts for the ADVAP ammunition calibers below 7.62mm, starting in FY 2019, will follow a similar strategy as the 7.62mm with planned accelerated FY 2020 MS B achievement.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development				EC2 I Adv Armor-Piercing (ADVAP) for Small Cal Ammo							
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Manager Maneuver Ammunition Systems (PM MAS) Labor & Travel	Various	Picatinny Arsenal : New Jersey	0.658	-		-		0.060		-		0.060	Continuing	Continuing	Continuing
Prototype Manufacturing	C/FFP	Jet Industrial : New Jersey	1.039	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Phase 1 Propellant Development	C/FFP	ATK : Virginia	0.141	-		-		-		-		-	0.000	0.141	-
Phase 2 Propellant Development	C/FFP	TBD : TBD	-	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Subtotal			1.838	-		-		1.060		-		1.060	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	6.387	-		-		1.700		-		1.700	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	1.000	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Subtotal			7.387	-		-		2.200		-		2.200	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	3.200	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Subtotal			3.200	-		-		0.500		-		0.500	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018					
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EC2 / Adv Armor-Piercing (ADVAP) for Small Cal Ammo						
	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	12.425	-		0.000		3.760		-		3.760	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
ADVAP 7.62mm Advanced Concept Development	[Redacted]				[Redacted]																							
	ADVAP 7.62mm Advanced Concept Development																											
ADVAP 7.62mm Prototype Test & Evaluation	[Redacted]				[Redacted]																							
	ADVAP 7.62mm Prototype Test & Evaluation																											
ADVAP 7.62mm Milestone B	1				[Redacted]																							
	ADVAP 7.62mm MS-B																											
ADVAP 7.62mm Engineering & Manufacturing Development	[Redacted]				[Redacted]				[Redacted]																			
	ADVAP 7.62mm EMD																											
ADVAP 7.62mm Preliminary Design Review (PDR)	2				[Redacted]																							
	ADVAP 7.62mm PDR																											
ADVAP 7.62mm Pre-Production Qualification Testing (PPQT)	[Redacted]				3				[Redacted]																			
	ADVAP 7.62mm PPQT				ADVAP 7.62mm CDR																							
ADVAP 7.62mm Critical Design Review (CDR)	[Redacted]				[Redacted]				[Redacted]																			
	ADVAP 7.62mm CDR																											
ADVAP 7.62mm Development Test & Evaluation	[Redacted]				[Redacted]				[Redacted]																			
	ADVAP 7.62mm DT&E																											
ADVAP 7.62mm Urgent Materiel Release (UMR)	[Redacted]				[Redacted]				5				[Redacted]															
	ADVAP 7.62mm UMR								ADVAP 7.62mm MS-C																			
ADVAP 7.62mm Milestone C	[Redacted]				[Redacted]				7				[Redacted]															
	ADVAP 7.62mm MS-C								ADVAP 7.62mm FMR																			
ADVAP 7.62mm Full Materiel Release (FMR)	[Redacted]				[Redacted]				8				[Redacted]															
	ADVAP 7.62mm FMR																											
ADVAP Small Caliber Ammunition Advanced Concept Development	[Redacted]				[Redacted]				[Redacted]																			
	ADVAP SC Ammo Advanced Concept Development																											
ADVAP Small Caliber Ammunition Prototype Test & Evaluation	[Redacted]				[Redacted]				[Redacted]																			
	ADVAP SC Ammo Prototype Test & Evaluation																											


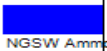




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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023															
	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												
ADVAP Small Caliber Ammunition Materiel Development Decision (MDD)									4																															
ADVAP SC Ammo Materiel Development Decision (MDD)																	10																							
ADVAP Small Caliber Ammunition Milestone B																					11																			
ADVAP Small Caliber Ammunition Engineering & Manufacturing Development																					14																			
ADVAP Small Caliber Ammunition Preliminary Design Review (PDR)																					17																			
ADVAP Small Caliber Ammunition Pre-Production Qualification Testing (PPQT)																									17															
ADVAP Small Caliber Ammunition Critical Design Review (CDR)																													17											
ADVAP Small Caliber Ammunition Milestone C																																	17							
NGSW Ammo Concept Development																	6																							
NGSW Ammo Milestone B																					9																			
NGSW Ammo Engineering & Manufacturing Development																					9																			
NGSW Ammo Developmental Testing (DT)																																								
NGSW Ammo Preliminary Design Review (PDR)																																								
NGSW Ammo Pre-Production Qualification Testing (PPQT)																																								

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023											
	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								
NGSW Ammo Critical Design Review (CDR)																																				
NGSW Ammo Production Qualification Testing (PQT)																																				
NGSW Ammo Milestone C																																				
NGSW Ammo First Unit Equipped (FUE)																																				
NGSW Family of Ammo Milestone B																																				
NGSW Family of Ammo Concept Development																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ADVAP 7.62mm Advanced Concept Development	1	2015	1	2017
ADVAP 7.62mm Prototype Test & Evaluation	1	2015	1	2017
ADVAP 7.62mm Milestone B	1	2017	1	2017
ADVAP 7.62mm Engineering & Manufacturing Development	2	2017	4	2019
ADVAP 7.62mm Preliminary Design Review (PDR)	2	2017	2	2017
ADVAP 7.62mm Pre-Production Qualification Testing (PPQT)	1	2018	1	2018
ADVAP 7.62mm Critical Design Review (CDR)	2	2018	2	2018
ADVAP 7.62mm Development Test & Evaluation	1	2019	3	2019
ADVAP 7.62mm Urgent Materiel Release (UMR)	2	2019	2	2019
ADVAP 7.62mm Milestone C	4	2019	4	2019
ADVAP 7.62mm Full Materiel Release (FMR)	1	2020	1	2020
ADVAP Small Caliber Ammunition Advanced Concept Development	1	2019	3	2020
ADVAP Small Caliber Ammunition Prototype Test & Evaluation	1	2019	3	2020
ADVAP Small Caliber Ammunition Materiel Development Decision (MDD)	1	2019	1	2019
ADVAP Small Caliber Ammunition Milestone B	4	2020	4	2020
ADVAP Small Caliber Ammunition Engineering & Manufacturing Development	4	2020	1	2023
ADVAP Small Caliber Ammunition Preliminary Design Review (PDR)	2	2021	2	2021
ADVAP Small Caliber Ammunition Pre-Production Qualification Testing (PPQT)	4	2021	2	2022
ADVAP Small Caliber Ammunition Critical Design Review (CDR)	3	2022	3	2022
ADVAP Small Caliber Ammunition Milestone C	1	2023	1	2023
NGSW Ammo Concept Development	1	2019	2	2019
NGSW Ammo Milestone B	2	2019	2	2019

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
NGSW Ammo Engineering & Manufacturing Development	2	2019	1	2022
NGSW Ammo Developmental Testing (DT)	3	2019	4	2019
NGSW Ammo Preliminary Design Review (PDR)	3	2020	3	2020
NGSW Ammo Pre-Production Qualification Testing (PPQT)	3	2020	1	2021
NGSW Ammo Critical Design Review (CDR)	2	2021	2	2021
NGSW Ammo Production Qualification Testing (PQT)	3	2021	4	2021
NGSW Ammo Milestone C	1	2022	1	2022
NGSW Ammo First Unit Equipped (FUE)	4	2022	4	2022
NGSW Family of Ammo Milestone B	4	2022	4	2022
NGSW Family of Ammo Concept Development	4	2022	1	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>				Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>			
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
EC3: <i>Ammunition Logistics Prototyping</i>	-	1.940	1.677	1.315	-	1.315	1.507	1.695	2.145	1.778	0.000	12.057
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019 Program Element (PE) 0603639A, Project EC3, Ammunition Logistics Prototyping will transition to E00700 CTG, 5.56mm, all types, E22203 Cartridges, Tank, 105mm and 120mm, all types, E80100 155mm Extended Range M982, and E08200 CTG, 25mm, all types.

A. Mission Description and Budget Item Justification

This Project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This Project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. FY 2019 funding will be used to complete verification testing and an operational demonstration for the environmental health monitoring system. FY 2019 funding will also continue verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability, and continue the maturation of the design and fabrication of prototype plastic polymer rectangular containers for developmental 5.56mm ammunition.

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

	FY 2017	FY 2018	FY 2019
Title: Munitions Health and Inventory Monitoring Systems	0.722	1.177	0.900
Description: Performance and reliability of certain munitions can be degraded by the environmental exposure history they have experienced in their lifetime. This Project will develop simple to complex environmental health and inventory monitoring systems to improve reliability and asset visibility and enable effective Condition Based Management for Ammunition.			
FY 2018 Plans: Complete system component integration and conduct verification testing and an operational demonstration for the environmental health monitoring system. Complete prototype development and verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability.			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Complete verification testing and an operational demonstration for the environmental health monitoring system. Continue verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability. FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 requires slightly less funding than FY 2018 because project will be transitioning to BA 5 in FY2019.				
Title: Munitions Containerization Systems Description: For each family of munitions containers, optimize prototype container systems for automation compatibility, combat unit load quantity, sustainability/recyclability, Insensitive Munitions/explosives safety, environmental protection, load reconfiguration, unitization, and standardized interfaces. This will improve ammunition distribution efficiency while minimizing environmental and operational impacts. FY 2018 Plans: Mature design and fabricate prototype plastic polymer rectangular containers for developmental 5.56mm ammunition. FY 2019 Plans: Perform design verification prototype testing and award contract to produce production representative polymer containers in preparation for qualification testing with 5.56 mm ammunition. FY 2018 to FY 2019 Increase/Decrease Statement: Funding in FY 2019 requires slightly less funding than FY 2018 as the project is prepared for production of qualification items for testing with 5.56 mm ammunition..		0.735	0.500	0.415
Title: Insensitive Munitions (IM) Integration Description: Optimize multiple IM technologies to improve munitions survivability and warfighter safety. Advanced IM Technologies will be developed in the areas of warhead, propulsion and propellants, explosives, packaging, and barriers. Efforts will increase the number of IM compliant ammunition items fielded in order to mitigate munitions reaction to unplanned stimuli such as fire, fragments, enclosed heat build-up (cook-off), bullets, adjacent munitions reaction (sympathetic detonation), and shape charge jet attacks.		0.483	-	-
Accomplishments/Planned Programs Subtotals		1.940	1.677	1.315
C. Other Program Funding Summary (\$ in Millions) N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>

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

Remarks

In FY 2019 Program Element (PE) 0603639A, Project EC3, Ammunition Logistics Prototyping will transition to E00700 CTG, 5.56mm, all types, E22203 Cartridges, Tank, 105mm and 120mm, all types, E80100 155mm Extended Range M982, and E08200 CTG, 25mm, all types.

D. Acquisition Strategy

Munitions Health Monitoring and Munitions Containerization systems will be developed through government and industry prototype efforts. In FY 2019 a Technology Readiness Assessment will be conducted to measure the progress of the designs.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Contract - Low Cost Thermal Indicator	C/TBD	TBD : TBD	1.630	-		-		-		-		-	0.000	1.630	-
Contract - RRAPDS	C/TBD	TBD : TBD	0.703	0.550		0.550		0.686		-		0.686	0.000	2.489	-
Contract-Plastic Cylindrical Container	C/TBD	TBD : TBD	0.250	0.300		0.500		-		-		-	0.000	1.050	-
Contract-Insensitive Munitions	C/TBD	TBD : TBD	0.476	0.100		-		-		-		-	0.000	0.576	-
Subtotal			3.059	0.950		1.050		0.686		-		0.686	0.000	5.745	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
ARDEC	MIPR	Picatiny Arsenal : NJ	1.987	0.840		0.477		0.379		-		0.379	0.000	3.683	-
Subtotal			1.987	0.840		0.477		0.379		-		0.379	0.000	3.683	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Yuma Proving Ground	MIPR	Yuma : AZ	0.086	-		-		-		-		-	0.000	0.086	-
Test and Eval	MIPR	TBD : TBD	-	0.150		0.150		0.250		-		0.250	0.000	0.550	-
Subtotal			0.086	0.150		0.150		0.250		-		0.250	0.000	0.636	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		5.132	1.940	1.677	1.315	1.315	0.000	10.064	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023												
	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									
Advanced Concept Development-Munitions Health Monitoring-1	[Redacted]																																				
	RRAPDS-Phase 1																																				
Advanced Concept Development-Munitions Health Monitoring-1A	[Redacted]																RRAPDS-Phase 2																				
Advanced Concept Development-Munitions Health Monitoring-2	[Redacted]																Low Cost Thermal Indicator																				
Advanced Concept Development-Munitions Containerization-1	[Redacted]																Munitions Containerization-Plastic Cylindrical Container																				
Advanced Concept Development-Munitions Containerization-1A	[Redacted]																Munitions Containerization-Plastic Rectangular Container																				
Advanced Concept Development-Insensitive Munitions	[Redacted]				Insensitive Munitions																																
Advanced Concept Development-Munitions Health Monitoring-3	[Redacted]																Next Generation Temperature/Humidity Sensor																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Advanced Concept Development-Munitions Health Monitoring-1	2	2015	4	2020
Advanced Concept Development-Munitions Health Monitoring-1A	1	2021	4	2023
Advanced Concept Development-Munitions Health Monitoring-2	2	2015	4	2022
Advanced Concept Development-Munitions Containerization-1	4	2019	4	2021
Advanced Concept Development-Munitions Containerization-1A	1	2020	4	2021
Advanced Concept Development-Insensitive Munitions	1	2016	4	2017
Advanced Concept Development-Munitions Health Monitoring-3	3	2017	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>				Project (Number/Name) EL7 / <i>Reduced Range Ammunition</i>			
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
EL7: <i>Reduced Range Ammunition</i>	-	1.314	7.600	7.618	-	7.618	0.000	0.000	0.000	0.000	0.000	16.532
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber Reduced Range Ammunition (RRA) technology applies to multiple calibers. As the technology matures in FY 2019, Program Element (PE) 0603639A, Project EL7, Reduced Range Ammunition for the 7.62mm variant will transition to PE 0604802A, Project EP3, Reduced Range Ammunition - Small Caliber. In FY 2020, the .50 Caliber variant will transition from Program Element (PE) 0603639A, Project EL7 to PE 0604802A, Project EP3.

A. Mission Description and Budget Item Justification

The small caliber Reduced Range Ammunition (RRA) project is a critical technology development in response to the 7.62mm and .50 caliber Capabilities Development Documents (CDD). The overall objective of RRA is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. RRA will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The RRA cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. FY 2019 funding will support Milestone (MS) B activities to include Request for Proposal (RFP), Preliminary Design Review (PDR) and Engineering and Manufacturing Development (EMD) contract award. Funding will also explore lessons learned from the United States Marine Corp (USMC) .50 Caliber Reduced Range Ammunition effort and other various options to satisfy the .50 Caliber reduced range requirement.

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

	FY 2017	FY 2018	FY 2019
Title: Technology Maturation and Risk Reduction (TMRR)	1.314	7.600	7.618
Description: Develop, demonstrate, and qualify small caliber 7.62mm and .50 caliber ammunition that will provide a reduced range training capability to the M240 and M2 gunner.			
FY 2018 Plans: FY 2018 focuses on activities on both 7.62mm and .50 caliber reduced range ammunition. 7.62mm prototypes will undergo Technology Readiness Level (TRL) 6 assessment and enter into Design Verification Testing (DVT) after a down select in preparation for Milestone B documentation. .50 caliber will conduct the Materiel Development Decision (MDD) and initiate the Technology Maturation and Risk Reduction phase by assessing several prototypes for TRL 5.			
FY 2019 Plans: FY 2019 primary activities will focus on further assessment of .50 Cal prototypes including leveraging lessons learned from the USMC prototypes, Technology Readiness Level (TRL) 6 assessment, conducting System Readiness Review (SRR), preparation			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL7 / <i>Reduced Range Ammunition</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
activities for Preliminary Design Review (PDR), preparing documentation for the .50 Milestone B, and preparing contract documentation for the Engineering and Manufacturing Development (EMD) contract.			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Funding is required to continue .50 caliber reduced range technology maturation and assessment.			
Accomplishments/Planned Programs Subtotals	1.314	7.600	7.618

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EP3: <i>Reduced Range Ammunition - Small Caliber</i>	-	-	2.473	-	2.473	8.280	14.826	10.129	8.003	0.000	43.711

Remarks
The effort under Program Element (PE) 0603639A, Project EL7, Reduced Range Ammunition (RRA), will transition in FY 2018 to PE 0604802A, Project EP3. PE 0604802A, Project EP3, RRA funding continues the development work of 7.62mm and supports Engineering and Manufacturing Development (EMD) in FY 2019. The project is not a new start.

D. Acquisition Strategy
After 7.62mm Milestone (MS) B in FY 2019, the Government intends to award an Engineering and Manufacturing Development (EMD) contract. The Government will then award a competitive contract for 7.62mm Pre-Production Qualification Testing (PPQT) hardware in FY 2020. The .50 Caliber program follows a similar strategy starting in FY 2018. After .50 Caliber Reduced Range Ammunition (RRA) MS B in FY 2020, the Government intends to award a competitive EMD contract.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development				EL7 / Reduced Range Ammunition							
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Manager Maneuver Ammunition Systems (PM MAS) - Labor and Travel	Various	Picatinny Arsenal : New Jersey	-	0.060		0.304		0.368		-		0.368	Continuing	Continuing	Continuing
Contractor 1	TBD	TBD : TBD	-	-		1.353		-		-		-	0.000	1.353	-
Contractor 2	TBD	TBD : TBD	-	-		1.353		-		-		-	0.000	1.353	-
Prototype	MIPR	PTI : New Jersey	-	0.157		-		-		-		-	0.000	0.157	-
Hardware	Various	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, New Jersey	-	0.112		-		1.000		-		1.000	Continuing	Continuing	Continuing
Subtotal			-	0.329		3.010		1.368		-		1.368	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	-	0.666		2.340		4.400		-		4.400	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	0.180		0.360		0.850		-		0.850	Continuing	Continuing	Continuing
Subtotal			-	0.846		2.700		5.250		-		5.250	Continuing	Continuing	N/A
Remarks															
N/A															

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL7 / <i>Reduced Range Ammunition</i>
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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	0.139		1.890		-		-		-	Continuing	Continuing	Continuing
Design Verification Testing (DVT)	TBD	TBD : TBD	-	-		-		1.000		-		1.000	0.000	1.000	-
Subtotal			-	0.139		1.890		1.000		-		1.000	Continuing	Continuing	N/A

Remarks
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	-	1.314	7.600	7.618	-	7.618	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL7 / <i>Reduced Range Ammunition</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023									
	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						
7.62mm Multiple Concept Design Evaluations	[Redacted]																																	
7.62mm Materiel Development Decision (MDD)				▲ 1 7.62mm MDD																														
7.62mm Design Verification Test (DVT)								[Redacted] 7.62mm DVT																										
7.62mm Milestone B (MS B)									▲ 3 7.62mm MS B																									
7.62mm Engineering and Manufacturing Development (EMD)													[Redacted]																					
7.62mm Preliminary Design Review (PDR) Government									▲ 4 7.62mm PDR Government																									
7.62mm Pre-Production Qualification Test (PPQT)																[Redacted] 7.62mm PPQT																		
7.62mm Critical Design Review (CDR)																			▲ 7 7.62mm CDR															
7.62mm Production Qualification Test (PQT)																								[Redacted] 7.62mm PQT										
7.62mm Milestone C (MS C)																												▲ 9 7.62mm MS C						
.50 Caliber Multiple Concept Design Evaluations									[Redacted]																									
.50 Caliber Materiel Development Decision (MDD)								▲ 2 .50 Caliber MDD																										
.50 Caliber Design Verification Test (DVT)												[Redacted] .50 Caliber DVT																						

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL7 / <i>Reduced Range Ammunition</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				
	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	
.50 Caliber Milestone B (MS B)													5 .50 Caliber MS B																
.50 Caliber Engineering and Manufacturing Development (EMD)																													
.50 Caliber Preliminary Design Review (PDR) Government																					6 .50 Caliber PDR Government								
.50 Caliber Pre-Production Qualification Test (PPQT)																					7 .50 Caliber PPQT								
.50 Caliber Critical Design Review (CDR)																									8 .50 Caliber CDR				
.50 Caliber Production Qualification Test (PQT)																									9 .50 Caliber PQT				
.50 Caliber Milestone C (MS C)																													10 .50 Caliber MS C

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL7 / <i>Reduced Range Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Multiple Concept Design Evaluations	1	2017	4	2018
7.62mm Materiel Development Decision (MDD)	4	2017	4	2017
7.62mm Design Verification Test (DVT)	2	2018	3	2018
7.62mm Milestone B (MS B)	1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)	1	2019	2	2022
7.62mm Preliminary Design Review (PDR) Government	4	2019	4	2019
7.62mm Pre-Production Qualification Test (PPQT)	2	2020	4	2020
7.62mm Critical Design Review (CDR)	2	2021	2	2021
7.62mm Production Qualification Test (PQT)	4	2021	2	2022
7.62mm Milestone C (MS C)	2	2022	2	2022
.50 Caliber Multiple Concept Design Evaluations	1	2018	1	2020
.50 Caliber Materiel Development Decision (MDD)	2	2018	2	2018
.50 Caliber Design Verification Test (DVT)	2	2019	3	2019
.50 Caliber Milestone B (MS B)	1	2020	1	2020
.50 Caliber Engineering and Manufacturing Development (EMD)	1	2020	2	2023
.50 Caliber Preliminary Design Review (PDR) Government	4	2020	4	2020
.50 Caliber Pre-Production Qualification Test (PPQT)	4	2020	2	2021
.50 Caliber Critical Design Review (CDR)	4	2021	4	2021
.50 Caliber Production Qualification Test (PQT)	1	2022	3	2022
.50 Caliber Milestone C (MS C)	2	2023	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>				Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>			
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
EL8: <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>	-	1.807	2.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.307
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The Lightweight Small Caliber Ammunition (LSCA) cartridge case technology will be applied to multiple calibers. The project involves developing and qualifying lightweight cartridge case, starting with 7.62mm ammunition, to replace current brass cartridge case. In FY 2019, Program Element (PE) 0603639A, Project EL8, Lightweight Cartridge Case for Small Caliber will transition to PE 0607131A, Project ER6, Direct Fire Technology.

A. Mission Description and Budget Item Justification

The Lightweight Small Caliber Ammunition (LSCA) Project is a critical technology development in response to the 7.62mm Capabilities Development Documents (CDD). The goal of the LSCA Project is to reduce the total Soldier load through reduction in ammunition weight. The LSCA Project will develop and field 7.62mm LSCA cartridges that will provide the same capabilities as the M80A1 and M62A1 cartridges. The LSCA cartridge will be designed to be compatible with all Army 7.62mm weapon systems, but optimized to work in the M240 Machine Gun.

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

	FY 2017	FY 2018	FY 2019
Title: 7.62mm Technology Maturation & Risk Reduction (TMRR) for Lightweight Small Caliber Ammunition (LSCA)	1.807	2.500	-
Description: Develop, demonstrate, and qualify a Lightweight Small Caliber Ammunition (LSCA) 7.62mm capability that will provide ten to fifty percent ammunition weight savings.			
FY 2018 Plans: Phase II Contractor is developing a preliminary lightweight cartridge design. The Government is completing the Systems Requirement Review and Preliminary Design Review then beginning Pre-Validation Testing.			
FY 2018 to FY 2019 Increase/Decrease Statement: Project EL8, LSCA will transition to PE 0607131A, Project ER6, Direct Fire Technology in FY 2019.			
Accomplishments/Planned Programs Subtotals	1.807	2.500	-

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
• ER6: <i>Direct Fire Technology</i>	-	0.855	3.500	-	3.500	2.570	1.520	0.600	-	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

The funding lines continue work on the 7.62mm ammunition which will transition to Program Element 0607131A, Project ER6, Direct Fire Technology in 2019.

D. Acquisition Strategy

Multiphase development contracts. Phase I and Phase II include development and evaluation of multiple designs/concepts. The Government intends to down-select to one design for Phase III in FY 2019 to manufacture test hardware to support Validation Testing planned for FY 2020. Low Rate Initial Production award will occur in FY 2021.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Program Manager Maneuver Ammunition Systems (PM MAS) - Labor and Travel	Various	Picatinny Arsenal : New Jersey	0.089	0.162		0.120		-		-		-	Continuing	Continuing	Continuing
Lightweight Case Phase 1 Development Contract	C/FFP	Orbital ATK : Missouri	0.636	-		-		-		-		-	0.000	0.636	-
Lightweight Case Phase 2 Development Contract 1	TBD	Picatinny Arsenal : New Jersey	-	-		0.440		-		-		-	Continuing	Continuing	Continuing
Lightweight Case Phase 2 Development Contract 2	TBD	Picatinny Arsenal : New Jersey	-	-		0.440		-		-		-	Continuing	Continuing	Continuing
Research	MIPR	United States Military Academy : New York	0.150	-		-		-		-		-	0.000	0.150	-
Phase 2 Case Development	C/FP	Nammo Talley : Mesa, Arizona	-	0.783		-		-		-		-	0.000	0.783	-
Modeling & Simulation	C/FP	Concurrent Technologies Corporation (CTC) : New Jersey	-	0.261		-		-		-		-	0.000	0.261	-
Lightweight Case Manufacturing Evaluation	SS/FP	Orbital ATK : Plymouth, Minnesota	-	0.316		-		-		-		-	0.000	0.316	-
Subtotal			0.875	1.522		1.000		-		-		-	Continuing	Continuing	N/A

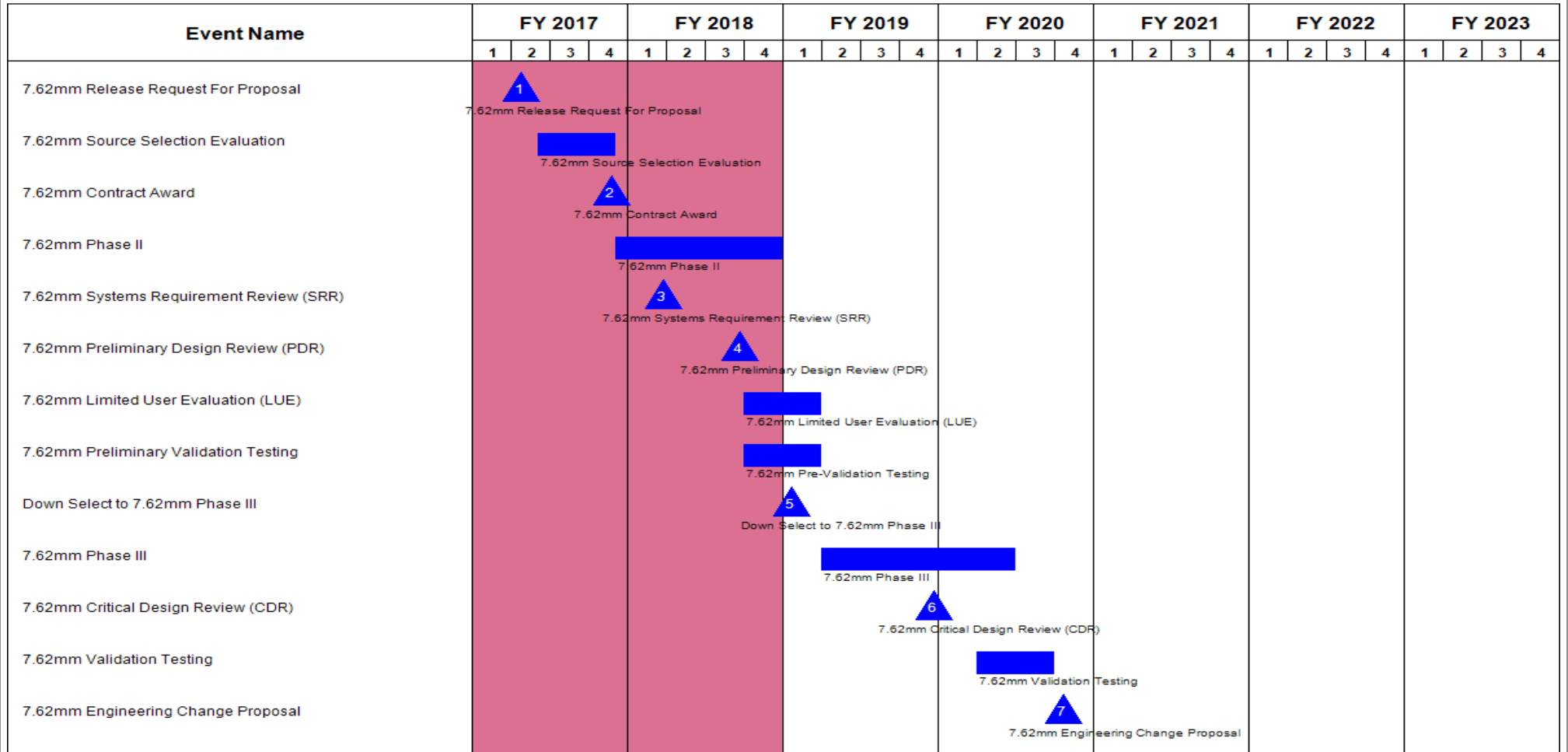
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	0.375	0.285		0.800		-		-		-	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	-		0.180		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development				EL8 / LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER							
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Subtotal			0.375	0.285		0.980		-		-		-	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	0.039	-		0.520		-		-		-	Continuing	Continuing	Continuing
Temperature testing	MIPR	Armament Research Development and Engineering Center : New Jersey	0.010	-		-		-		-		-	0.000	0.010	-
Subtotal			0.049	-		0.520		-		-		-	Continuing	Continuing	N/A
Project Cost Totals			1.299	1.807		2.500		-		-		-	Continuing	Continuing	N/A
Remarks															


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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
7.62mm Low Rate Initial Production (LRIP) Award																	 7.62mm LRIP Award											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Release Request For Proposal	2	2017	2	2017
7.62mm Source Selection Evaluation	2	2017	4	2017
7.62mm Contract Award	4	2017	4	2017
7.62mm Phase II	4	2017	4	2018
7.62mm Systems Requirement Review (SRR)	1	2018	1	2018
7.62mm Preliminary Design Review (PDR)	3	2018	3	2018
7.62mm Limited User Evaluation (LUE)	4	2018	1	2019
7.62mm Preliminary Validation Testing	4	2018	1	2019
Down Select to 7.62mm Phase III	1	2019	1	2019
7.62mm Phase III	2	2019	2	2020
7.62mm Critical Design Review (CDR)	4	2019	4	2019
7.62mm Validation Testing	2	2020	3	2020
7.62mm Engineering Change Proposal	4	2020	4	2020
7.62mm Low Rate Initial Production (LRIP) Award	1	2021	1	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>				Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>			
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
EU1: <i>Enhanced Lethality Cannon Munitions</i>	-	9.486	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.486
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019, PE 0603639A, Project EU1, Enhanced Lethality Cannon Munitions, will transition to PE 0604802A Project EU6, 155mm High Explosive Extended Range Artillery.

A. Mission Description and Budget Item Justification

The Enhanced Lethality Cannon Munitions (ELCM) project evaluates, develops, matures, and demonstrates new lethality technologies for 155mm cannon artillery munitions and evaluates their effectiveness in mitigating evolving and derived capability gaps, and support transition to Engineering Manufacturing Development (EMD). The ELCM project prototypes and accelerates the maturation of enhanced lethality technologies, such as Lithographic Fragmentation Technology (LFT) or pre-formed fragmentation, for 155mm cannon artillery munitions. The ELCM project accelerates the development and maturation of LFT for subsequent integration on the 155mm XM1128 high explosive projectile per HQDA G-8 Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition, 22 December 2016. ELCM also supports prototyping of enhanced lethality technologies applicable to 155mm cannon artillery munitions, including prototyping of projectile design, explosive formulations, fragmentation, and software for the 155mm XM1113 effort, which is a potential long-range cannon projectile that will increase range by 10km or greater and contain twice as much rocket motor grains as the current 155mm long range cannon projectile that is now obsolete. The design requires increased lethality since the projectile contains a reduced amount of explosive to make room for the increased amount of rocket motor grains required for increased range. ELCM addresses requirements for increased lethality above the current U.S. Army go-to-war 155mm high explosive unitary projectiles, the M795 Insensitive Munition and obsolete M549A1 Unitary Munition.

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

	FY 2017	FY 2018	FY 2019
Title: Enhanced Lethality Cannon Munitions	9.486	4.900	-
Description: Evaluate, Develop, Prototype and Demonstrate Enhanced Lethality technologies.			
FY 2018 Plans: Conduct prototyping of enhanced lethality technologies applicable to 155mm cannon artillery munitions.			
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease in funds in FY 2019 due to the maturation and transition of enhanced lethality technologies.			
Title: 155mm HE Rocket Assist Project (RAP) Extended Range	-	5.100	-
Description: Evaluate, Develop, and Demonstrate Extended Range technologies.			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p><i>FY 2018 Plans:</i> Conduct a Critical Design Review. Complete Technology Readiness Level (TRL) TRL6 live demonstration in the 39 caliber weapon system. Complete Milestone B Decision.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Decrease in funds in FY 2019 due to transition of enhanced lethality technologies to Budget Activity (BA) 5 Program Element (PE) 0604802A Project EU6, 155mm High Explosive Extended Range Artillery, in FY 2019.</p>			
Accomplishments/Planned Programs Subtotals	9.486	10.000	-

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EU6: <i>155mm High Explosive Extended Range Artillery</i>	-	-	7.000	-	7.000	5.000	3.000	-	-	0.000	15.000

Remarks
In FY 2019, PE 0603639A, Project EU1, Enhanced Lethality Cannon Munitions, will transition to PE 0604802A Project EU6, 155mm High Explosive Extended Range Artillery. This Project is not a New Start.

D. Acquisition Strategy
As pre-Milestone B advanced component development and competitive prototyping projects, these efforts will identify, develop, prototype, evaluate, analyze, and demonstrate potential enhanced lethality and extended range alternative solutions for Government and/or Industry. These efforts will quantify the respective maturity and effectiveness to mitigate capability gaps against representative enemy target sets and operational scenarios. Enhanced lethality and extended range technologies will be evaluated for merit and transition onto new cannon artillery munitions programs of record as appropriate. Following Milestone B, new cannon munitions programs will enter EMD.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
ELCM Prototyping	MIPR	Various : Various	-	4.260		3.900		-		-		-	0.000	8.160	-
XM1113 Prototyping	MIPR	Various : Various	-	-		1.000		-		-		-	0.000	1.000	-
XM1113 Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC): ATK : TBD	-	-		1.600		-		-		-	0.000	1.600	-
Subtotal			-	4.260		6.500		-		-		-	0.000	10.760	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
ELCM Program Management	MIPR	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.430		0.400		-		-		-	0.000	0.830	-
XM1113 Program Management	MIPR	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		0.400		-		-		-	0.000	0.400	-
ELCM Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	2.046		0.600		-		-		-	0.000	2.646	-
XM1113 Engineering Support	MIPR	Armament Research Development Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		0.800		-		-		-	0.000	0.800	-
Subtotal			-	2.476		2.200		-		-		-	0.000	4.676	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>
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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Performance-related Lethality Developmental Testing	MIPR	Naval Surface Warfare Center (NSWC) - Dahlgren : Dahlgren, VA	-	0.610		1.100		-		-		-	0.000	1.710	-
Lethality Simulations and Evaluation	MIPR	Army Materiel Systems Analysis Activity (AMSA) : Aberdeen, MD	-	0.640		-		-		-		-	0.000	0.640	-
Lethality Simulations and Evaluation	MIPR	US Training and Doctrin Command (TRADOC); White Sands Missile Range (TRAC-WSMR) : White Sands Missile Range, New Mexico	-	1.500		-		-		-		-	0.000	1.500	-
Performance-related Lethality Developmental Testing	MIPR	Army Test and Evaluation Command (ATEC): Yuma Proving Ground : Yuma, AZ	-	-		0.200		-		-		-	0.000	0.200	-
Subtotal			-	2.750		1.300		-		-		-	0.000	4.050	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	-	9.486	10.000	-	-	-	0.000	19.486	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
XM1128 Prototyping																												
XM1128 Preliminary Design Review (PDR)																												
XM1128 Lethality Testing																												
XM1128 Lethality Assessment																												
ELCM Prototyping																												
ELCM Lethality Testing																												
ELCM Lethality Assessment																												
XM1128 Baseline Prototyping; BA5 PE 0604802A EU7																												
XM1128 Critical Design Review (CDR)																												
XM1128 Performance Qualification Testing (PQT); BA5 PE 0604802A EU7																												
XM1128 Milestone C																												
XM1113 Prototyping																												
XM1113 Lethality Testing and Assessment																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
XM1113 Preliminary Design Review (PDR); BA5 PE 0604802A EU6									3 ▲ XM1113 PDR																			
XM1113 Critical Design Review (CDR); BA5 PE 0604802A EU6									4 ▲ XM1113 CDR																			
XM1113 Performance Qualification Testing (PQT); BA5 PE 0604802A EU6																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1128 Prototyping	3	2017	4	2017
XM1128 Preliminary Design Review (PDR)	4	2017	4	2017
XM1128 Lethality Testing	4	2017	4	2017
XM1128 Lethality Assessment	4	2017	1	2018
ELCM Prototyping	1	2018	2	2018
ELCM Lethality Testing	2	2018	3	2018
ELCM Lethality Assessment	4	2018	4	2018
XM1128 Baseline Prototyping; BA5 PE 0604802A EU7	1	2018	3	2018
XM1128 Critical Design Review (CDR)	3	2018	3	2018
XM1128 Performance Qualification Testing (PQT); BA5 PE 0604802A EU7	3	2018	4	2019
XM1128 Milestone C	2	2020	2	2020
XM1113 Prototyping	1	2018	3	2018
XM1113 Lethality Testing and Assessment	3	2018	4	2018
XM1113 Preliminary Design Review (PDR); BA5 PE 0604802A EU6	4	2018	4	2018
XM1113 Critical Design Review (CDR); BA5 PE 0604802A EU6	4	2019	4	2019
XM1113 Performance Qualification Testing (PQT); BA5 PE 0604802A EU6	1	2020	3	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>					Project (Number/Name) EU2 / <i>Improved Multi-Option Fuze (iMOFA/iMOFM)</i>		
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
<i>EU2: Improved Multi-Option Fuze (iMOFA/iMOFM)</i>	-	7.588	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.588
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Improved Multi-Option Fuze (iMOFA/iMOFM) project will identify, develop, prototype, and demonstrate new improved multi-option fuze technologies, components, and subsystems based on Government-owned Next Generation Proximity Sensor (NGPS) capabilities with built-in exportability attributes previously matured via OSD sponsored tech base efforts under the Joint Fuze Technology Program and Defense Exportability Features (DEF) Congressional Pilot Program. This project will support technology maturation and risk reduction, and will evaluate and analyze producibility, affordability, safety, and compatibility of these prototype potential materiel solutions in representative realistic performance-related developmental tests. This project will enable fact-based analysis of new Government-owned height of burst/proximity fuzing alternatives that are resistant to enemy countermeasures and reverse engineering threats, quantify their effectiveness, reduce integration risk, and support transition into existing/new artillery/mortar fuzes and munitions.

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

	FY 2017	FY 2018	FY 2019
Title: Improved Multi-Option Fuze	7.588	-	-
Description: Identify, develop, prototype, and assess improved multi-option fuze technologies.			
Accomplishments/Planned Programs Subtotals	7.588	-	-

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
• EU8: <i>Improved Multi-Option Fuze</i>	-	8.000	8.000	-	8.000	10.000	-	-	-	0.000	26.000

Remarks

D. Acquisition Strategy

As an advanced component development and risk reduction project, this effort will identify, develop, prototype, evaluate, analyze, and demonstrate potential improved Multi-Option Fuze component solutions from Government and/or Industry. This effort will quantify their respective maturity and assess and mitigate the level of risk in providing conventional Cannon Artillery and Mortar munitions a height of burst/proximity fuzing capability that is resistant to enemy countermeasures and reverse engineering threats. Appropriate mature potential solutions will be selected for subsequent transition and technical implementation as an inherent part of improved Multi-Option Fuze programs of record via subsequent Engineering and Manufacturing Development program for Type Classification into existing multi-option fuzes for Cannon

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU2 / <i>Improved Multi-Option Fuze (iMOFA/iMOFM)</i>
Artillery and Mortar Munitions with supporting detailed government-owned Technical Data Packages (TDPs) to enable "build to print" by Industry. The DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives are utilized to produce the component and fuze prototypes.		
E. Performance Metrics N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development	Project (Number/Name) EU2 I Improved Multi-Option Fuze (iMOFA/ iMOFM)
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Improved Multi-Option Fuze Development and Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	5.259	Jun 2017	-		-		-		-	0.000	5.259	5.892
Subtotal			-	5.259		-		-		-		-	0.000	5.259	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, New Jersey	-	0.652	Jun 2017	-		-		-		-	0.000	0.652	0.652
Engineering Studies	MIPR	United States Military Academy : West Point, NY	-	0.100	Jun 2017	-		-		-		-	0.000	0.100	0.100
Subtotal			-	0.752		-		-		-		-	0.000	0.752	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Improved Multi-Option Fuze Evaluations	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	1.477	Jun 2017	-		-		-		-	0.000	1.477	0.500
Improved Multi-Option Fuze Tests	MIPR	Army Research Lab (ARL) : Adelphi, MD	-	0.100	Jul 2017	-		-		-		-	0.000	0.100	0.500
Subtotal			-	1.577		-		-		-		-	0.000	1.577	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EU2 / Improved Multi-Option Fuze (iMOFA/ iMOFM)				

	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	-	7.588	0.000	-	-	-	0.000	7.588	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU2 / <i>Improved Multi-Option Fuze (iMOFA/iMOFM)</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Identify, Develop, and Prototype Candidate for Technology Solution; BA4 EU2	██████████																											
Conduct Performance-Related Developmental Tests; BA4 PE 0603639A EU2					██████████																							
Evaluate and Analyze Prototype Solutions and Transition Technology; BA4 PE 0603639A EU2					██████████																							
Fabricate Prototypes; Transition to BA5 PE 0604802A EU8					██████████																							
Conduct Evaluations and Design Reviews; BA5 PE 0604802A EU8									██████████																			
Fabricate System Level Qualification Hardware; BA5 PE 0604802A EU8													██████████															
Safety, Reliability and Environmental Testing; BA5 PE 0604802A EU8																	██████████											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU2 / <i>Improved Multi-Option Fuze (iMOFA/iMOFM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Identify, Develop, and Prototype Candidate for Technology Solution; BA4 EU2	3	2017	1	2018
Conduct Performance-Related Developmental Tests; BA4 PE 0603639A EU2	1	2018	3	2018
Evaluate and Analyze Prototype Solutions and Transition Technology; BA4 PE 06036	2	2018	1	2019
Fabricate Prototypes; Transition to BA5 PE 0604802A EU8	2	2018	4	2018
Conduct Evaluations and Design Reviews; BA5 PE 0604802A EU8	4	2018	3	2019
Fabricate System Level Qualification Hardware; BA5 PE 0604802A EU8	3	2019	1	2020
Safety, Reliability and Environmental Testing; BA5 PE 0604802A EU8	1	2020	2	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>					Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>		
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
FA5: <i>Assured Precision Weapons and Munitions</i>	-	9.779	13.000	14.340	-	14.340	11.862	7.907	0.000	0.000	0.000	56.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Assured Precision Weapons and Munitions (APWM) project is a continuation of efforts initiated under Budget Activity 4 (BA4) Program Element (PE) 0604120A Project ED5. The objective of this advanced risk mitigation, prototyping and product support effort is to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems in a system of systems environment. The APWM efforts directly support three of the Chief of Staff of the Army's (CSA) "Big 6" Modernization Priorities. Specifically, they support; Long Range Precision Fires, Network/C3I (incl Assured PNT), and Soldier Lethality. The APWM project will enable increased lethality and ensure future battlefield success against peer/near-peer adversaries by supporting these Modernization Priorities. Current and evolving threats to existing Positioning, Navigation, and Timing (PNT) capabilities have created the need for new/emerging Assured PNT capabilities (including M-Code GPS and Pseudolites) into both Munitions and Weapons operating in a complex system-of-systems environment. This imperative is reinforced by Public Law 111-383 Section 913 which mandates the use of Air Force-developed M-Code GPS capabilities in all systems fielded FY2018 and beyond unless a waiver is obtained from the Secretary of Defense. As such, both precision weapon and munition programs must coordinate with the development and technology delivery activities of the Air Force's Military GPS User Equipment (MGUE) program and the Army's Assured PNT program to protect and insure critical precision-based Joint warfighting capabilities as well as maximizing effectiveness and efficiency of US taxpayer investments. FY 2019 funding will support the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, configuration management of the evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions (PGM), and specific support focus includes requirements for MGUE Increment 2, Pseudolites (PL), and Alternative Navigation (AltNav) related technology maturity for Assured PNT milestone decisions.

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

	FY 2017	FY 2018	FY 2019
Title: Assured Precision Weapons and Munitions Integrated Product Support - Joint Lethality PNT SME WIPT	1.614	2.900	2.255
Description: Provide assured precision weapons and munitions technical subject matter expertise and support to the Oversight board for assured precision weapons and munitions.			
FY 2018 Plans: The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, and configuration management of the			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions. Specific support focus includes requirements for MGUE Increment 2 and Pseudolite related technology maturity for Assured PNT Milestone decisions.</p> <p>FY 2019 Plans: The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, and configuration management of the evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions. Specific support focus includes requirements for MGUE Increment 2 and Pseudolite related technology maturity for Assured PNT Milestone decisions.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decrement is due to Air Force SME feedback requiring less funds to support the WIPT based on previous WIPT demands.</p>				
<p>Title: PGM MGUE Anti-Spoof Risk Reduction Effort</p> <p>Description: Implementing Anti-Spoof (AS) capabilities on MGUE PGM receivers is a major risk to PGMs (including Precision Guidance Kit (PGK)). This effort will identify, evaluate, and quantify the predicted performance of AS capabilities against various MGUE PNT threat scenarios and their corresponding impacts on Time To Assured Navigation (TTAN) for PGMs and resulting operational performance impacts to reduce risk to multiple adopting PGM Programs of Record (PoRs).</p>		8.165	-	-
<p>Title: Assured PNT related Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)</p> <p>Description: Mature and test Zero-Age-of-Data (ZAOD) for improved measurement accuracy of Network Assisted GPS data provided to Users.</p> <p>FY 2018 Plans: Initiate analysis, evaluation and implementation of Zero-Age-of-Data (ZAOD) in Network Assisted GPS to provide Users with more accurate GPS Satellite Data to improve mission effectiveness.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Zero Age of data implementation will be completed in FY18. No funds will be needed for this effort in FY19.</p>		-	0.500	-
<p>Title: Assured PNT related Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement</p>		-	-	0.767

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Description: Evaluate, mature and test assured position, navigation, and timing (A-PNT) system/subsystem components for area denial and area denial enabling technologies.</p> <p>FY 2019 Plans: Initiate analysis and evaluation of various assured precision prototype technologies for future area denial and area denial enabling technologies to support the PoR in their Analysis of Alternatives (AoA).</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: PNT efforts for FASCAM will start in FY19.</p>				
<p>Title: Assured PNT related Integration Risk Mitigation - Modified NA GPS & VMF to support PL & M-Code for Weapons & Munitions (Phase 1 & 2)</p> <p>Description: Evaluate, mature and test technologies for Network Assisted GPS that supports Pseudolites and M-code for Weapons through two phased efforts (phase 1 & 2)</p> <p>FY 2018 Plans: Architecture development, message interface definitions, use case definition and requirements development for an updated NA GPS prototype that incorporates PL and M-Code.</p> <p>FY 2019 Plans: Software development, integration and test for an updated NA GPS prototype that incorporates PL and M-Code in phase 1.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort started in FY18 with requirements development and will transition to software development and test in FY19 requiring more support.</p>		-	4.200	6.300
<p>Title: Assured PNT related Weapons and Munitions Prototyping - PGK with Upgraded PGM Fuze Setter</p> <p>Description: Develop, prototype, and evaluate required emerging Assured PNT technology enhancements to the PGM Fuze Setter needed to enable continued performance of Precision Guided Munitions in a threat environment.</p> <p>FY 2018 Plans: Architecture development, message interface definitions, use case definition and requirements development for an upgraded PGM Fuze Setter incorporating PL and M-Code to enable continued performance of Precision Guided Munitions in a threat environment.</p> <p>FY 2019 Plans:</p>		-	3.500	2.680

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Software development, integration and test for a prototype upgraded PGM Fuze Setter incorporating PL and M-Code to enable continued performance of Precision Guided Munitions in a threat environment. FY 2018 to FY 2019 Increase/Decrease Statement: Effort includes many stakeholders and SMEs for FY18 activities of requirement development. Team does not need to be as large for FY19 plans of implementing requirements defined in FY18.				
Title: Assured PNT related Weapons and Munitions Prototyping - M-code & PLs on Towed Howitzer Platforms - M77A2 & M119A3 Description: Prototype and evaluate MGUE Increment 1 (M-code) GPS receiver cards in the M777A2 and M119A3 Towed Howitzer Platforms and evaluate technologies for providing Assured PNT to PGMs. FY 2018 Plans: Update GPS receiver interfaces on fire platforms, integrating and testing the MGUE Inc 1 cards and assessing performance impacts FY 2019 Plans: Update GPS receiver interfaces on fire platforms, integrating and testing the MGUE Inc 1 cards PL interoperability and assessing performance impacts. FY 2018 to FY 2019 Increase/Decrease Statement: Majority of software updates and testing will be conducted in FY18. FY19 will include testing only and does not require a large support team.		-	1.100	0.472
Title: Assured PNT related Weapons and Munitions Prototyping - Alternative Navigation Technologies (AltNav) (Phase 1 & 2) Description: Develop, prototype, and evaluate non Global Positioning System Radio Frequency (Non-GPS RF) Navigation prototype systems for indirect fires support platform navigation systems through two phased efforts (Phase 1 & 2) FY 2018 Plans: Examine and define how non GPS RF Navigation technology can meet current navigation and timing requirements without access to GPS and how concept can aid GPS in a GPS degraded environment. FY 2019 Plans: Prototyping and evaluation of non Global Positioning System Radio Frequency (GPS RF) Navigation prototype systems that can meet current navigation and timing requirements without access to GPS or in a GPS degraded environment in phase 1. FY 2018 to FY 2019 Increase/Decrease Statement:		-	0.800	1.866

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
FY18 tasks include requirements development and prototype planning efforts which do not require a large team. FY19 tasks include conducting prototyping and testing which requires a larger technical team for support and increased funding.			
Accomplishments/Planned Programs Subtotals	9.779	13.000	14.340

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

N/A

Remarks

D. Acquisition Strategy

The Planned Acquisition Strategy for the Assured Precision Weapons and Munitions program is to utilize the Defense Ordinance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism to obtain prototypes to demonstrate and evaluate the maturity and integration risk of the M-Code GPS on Precision Cannon Munitions and Weapons as well as other Assured PNT related capabilities.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development				FA5 / Assured Precision Weapons and Munitions							
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
PGM MGUE AS Risk Reduction	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	7.785	Dec 2016	-		-		-		-	Continuing	Continuing	Continuing
Assured PNT related Weapons Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		3.265	Dec 2017	3.585	Dec 2018	-		3.585	Continuing	Continuing	Continuing
Assured PNT related Weapons Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		2.000	Dec 2017	2.000	Dec 2018	-		2.000	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		2.500	Dec 2017	2.500	Dec 2018	-		2.500	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		2.000	Dec 2017	2.000	Dec 2018	-		2.000	Continuing	Continuing	Continuing
Subtotal			-	7.785		9.765		10.085		-		10.085	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management	Various	Program Executive Office (PEO) Ammunition (Ammo) : Picatinny Arsenal, NJ	-	0.508	Dec 2016	0.625	Dec 2017	0.655	Dec 2018	-		0.655	Continuing	Continuing	Continuing
Assured Precision Weapons and Munitions IPT Support	MIPR	Various : Various	-	1.106	Dec 2016	2.155	Dec 2017	1.600	Dec 2018	-		1.600	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army													Date: February 2018		
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)					
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development						FA5 / Assured Precision Weapons and Munitions					
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Assured Technologies Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.380	Dec 2016	0.455	Dec 2017	1.200	Dec 2018	-		1.200	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Communication Electronics Research, Development and Engineering Center (CERDEC) : Aberdeen Proving Ground, MD	-	-		-		0.800	Dec 2018	-		0.800	Continuing	Continuing	Continuing
Subtotal			-	1.994		3.235		4.255		-		4.255	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			-	9.779		13.000		14.340		-		14.340	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
PGM MGUE Anti-Spoof (AS) Risk Reduction Effort	█				█																							
Integration Risk Mitigation - Modified NA GPS & VMF to support PL & M-Code	█				█				█				█				█											
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)	█				█				█																			
Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement	█				█				█				█															
Integration Risk Mitigation - Modified NA GPS & VMF for GMLRS & Launcher	█				█				█				█				█											
Integration Risk Mitigation - Fire System-of-Systems PL related C2 & AS	█				█				█				█				█											
Integration Risk Mitigation - System of Systems Test	█				█				█				█				█				█							
Weapons & Munitions Prototyping - A-PNT related PGK w Upgraded Cannon PGM Fuz	█				█				█				█															
Weapons & Munitions Prototyping - M777A2 & M119A3 MGUE Increment 1	█				█				█				█															
Weapons & Munitions Prototyping - Alternative Navigation Technologies	█				█				█				█				█											
Intregrated Product Support - Joint Lethality PNT SME WIPT/Progr	█				█				█				█				█				█							

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PGM MGUE Anti-Spoof (AS) Risk Reduction Effort	1	2017	4	2017
Integration Risk Mitigation - Modified NA GPS & VMF to support PL & M-Code	1	2018	4	2021
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)	1	2018	4	2018
Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement	1	2019	4	2020
Integration Risk Mitigation - Modified NA GPS & VMF for GMLRS & Launcher	1	2020	4	2021
Integration Risk Mitigation - Fire System-of-Systems PL related C2 & AS	1	2021	4	2022
Integration Risk Mitigation - System of Systems Test	1	2022	4	2023
Weapons & Munitions Prototyping - A-PNT related PGK w Upgraded Cannon PGM Fuze	1	2018	4	2019
Weapons & Munitions Prototyping - M777A2 & M119A3 MGUE Increment 1	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies	1	2018	4	2021
Intregrated Product Support - Joint Lethality PNT SME WIPT/Program Management	1	2017	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)			
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
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.000	1.000	4.947	-	4.947	8.897	14.826	19.765	22.724	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Cannon-Delivered Area Effects Munitions (C-DAEM) Project will analyze, identify, develop, prototype, and demonstrate 155mm Cannon Artillery munition area effects capability. C-DAEM are envisioned as a suite of 155mm artillery munitions, to provide U.S. ground forces with a capability to effectively engage area targets to destroy, neutralize and/or suppress threat platforms and facilities, and deny threat forces full operational freedom within the targeted area. Initial objective values for C-DAEM would meet Dual Purpose Improved Conventional Munitions (DPICM) effects capabilities against personnel and light vehicles and exceed DPICM effects capabilities against armor. An Analysis of Alternatives (AoA) will be completed to best inform necessary area effect lethality requirements. The Project addresses requirements from the U.S. Army adopted U.S. Marine Corps (USMC) C-DAEM Initial Capabilities Document (ICD) [Army Requirements Oversight Council (AROC) adopted 20 October 2016, Joint Requirements Oversight Council (JROC) approved 11 May 2016]. The approved C-DAEM ICD as an Army requirement is located in the Capabilities and Army Requirements Documents number 0438. The Joint Staffing Designator is JROC Interest. FY 2019 will support the preparation and evaluation of the Request for Proposals (RFP) for technologies and capabilities identified through the AoA, as well as the development of the Capabilities Development Document (CDD) for each technology.

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

	FY 2017	FY 2018	FY 2019
Title: C-DAEM AoA	-	1.000	4.947
Description: The C-DAEM AoA will assess a range of alternatives for replacing the DPICM for current 155mm cannon systems. The goal is to inform the Milestone Decision Authority (MDA) of cost-effective and affordable alternatives that provide performance similar to or better than DPICM.			
FY 2018 Plans: Complete C-DAEM AoA to inform C-DAEM required capabilities. Conduct Milestone A review with MDA.			
FY 2019 Plans: FY 2019 will support the preparation and evaluation of the Request for Proposals (RFP) for technologies and capabilities identified through the AoA, as well as the development of the Capabilities Development Document (CDD) for each technology.			
FY 2018 to FY 2019 Increase/Decrease Statement: In FY 2018, PE 0603639A Project FG1, Cannon-Delivered Area Effects Munitions was a New Start. Upon completion of MS-A, Program Office will initiate competitive prototyping in FY 2019.			
Accomplishments/Planned Programs Subtotals	-	1.000	4.947

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy As a Pre-Milestone A project in the Milestone Solution Analysis (MSA) phase, this effort will inform desired C-DAEM capabilities. Milestone A currently planned for 4Q FY 2018. C-DAEM will execute a competitive prototyping Technology Maturation Risk Reduction (TMRR) phase 1Q FY 2019 through 4Q FY 2020 in preparation for Milestone B on materiel solutions to meet capabilities informed by the AoA and Requirements. 1Q FY 2021 through 4Q FY 2023, C-DAEM will execute the Engineering & Manufacturing Development (EMD) and complete Milestone C in 4Q FY 2023.		
E. Performance Metrics N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Weapons and Munitions - Advanced Development				FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)							
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
C-DAEM Prototype Hardware	MIPR	TBD : TBD	-	-		-		2.400	Dec 2018	-		2.400	Continuing	Continuing	Continuing
Subtotal			-	-		-		2.400		-		2.400	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		1.000	Dec 2017	-		-		-	Continuing	Continuing	Continuing
Engineering Support	MIPR	Armament Research Development Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		2.147	Dec 2018	-		2.147	Continuing	Continuing	Continuing
Subtotal			-	-		1.000		2.147		-		2.147	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
C-DAEM Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		-		0.400	Dec 2018	-		0.400	Continuing	Continuing	Continuing
Subtotal			-	-		-		0.400		-		0.400	Continuing	Continuing	N/A

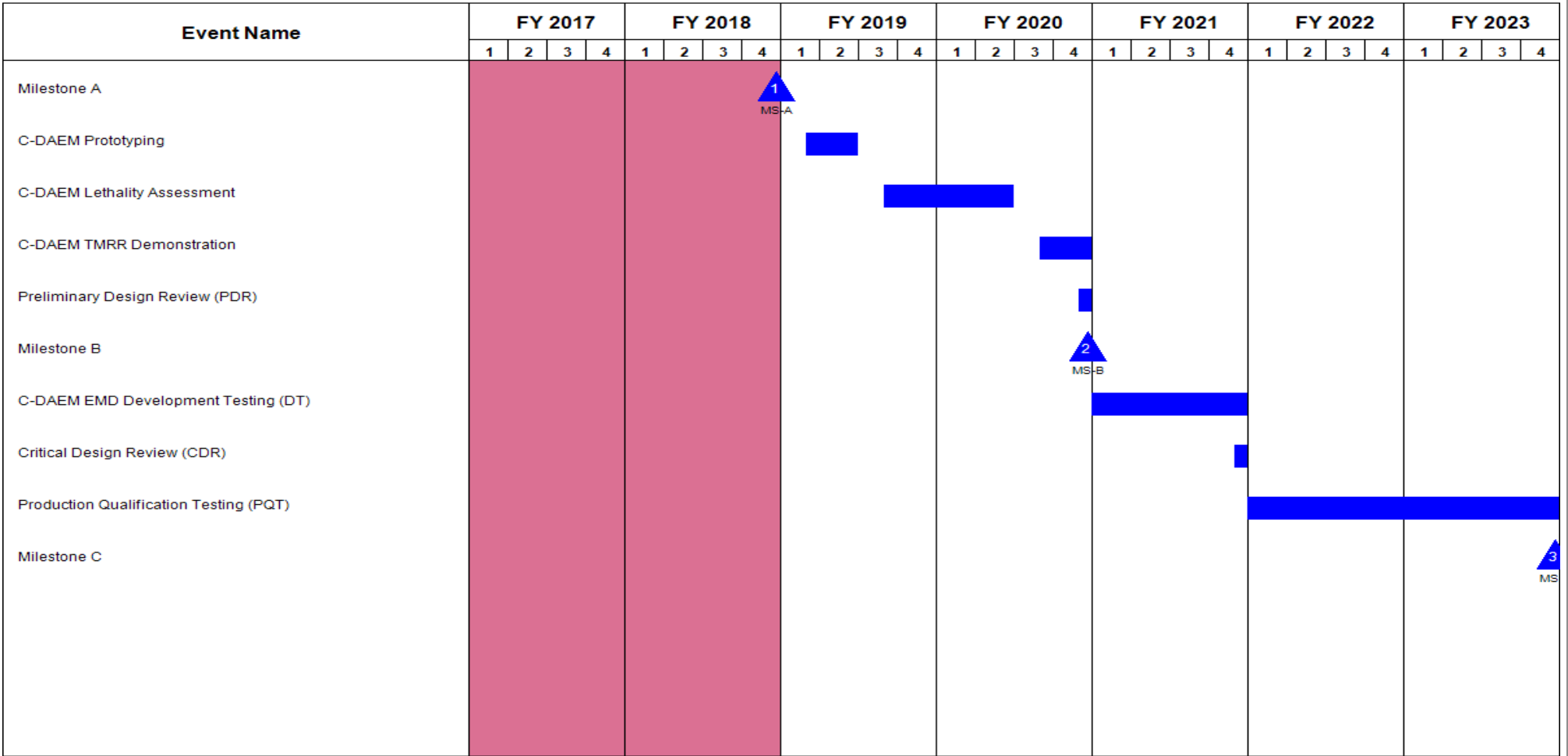
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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018			
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)				
	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	-	-	1.000		4.947	-	4.947	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone A	4	2018	4	2018
C-DAEM Prototyping	1	2019	2	2019
C-DAEM Lethality Assessment	3	2019	2	2020
C-DAEM TMRR Demonstration	3	2020	4	2020
Preliminary Design Review (PDR)	4	2020	4	2020
Milestone B	4	2020	4	2020
C-DAEM EMD Development Testing (DT)	1	2021	4	2021
Critical Design Review (CDR)	4	2021	4	2021
Production Qualification Testing (PQT)	1	2022	4	2023
Milestone C	4	2023	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>					Project (Number/Name) XT5 / <i>30mm Anti-Personnel and Counter UAS</i>		
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
XT5: <i>30mm Anti-Personnel and Counter UAS</i>	-	0.000	2.475	3.859	-	3.859	5.832	0.000	0.000	0.000	0.000	12.166
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018, Program Element 0603639A, Project XT5, 30mm Anti-Personnel and Counter UAS is a new start program.

A. Mission Description and Budget Item Justification

Lightweight 30mmx113mm (LW30) Airburst is a new capability identified as a Warfighter requirement in the Capability Production Document (CPD), AH-64E Helicopter, Increment 1, Version 6. The LW30 airburst cartridge improves the ability of the warfighter to effectively engage anti-personnel/materiel targets due to increased lethality. Airburst capability provides the user a much higher probability of achieving a first burst kill against enemy personnel targets in the open. The LW30 will retain its dual purpose warhead, allowing it to continue to defeat light armored threats through point detonation. The cartridge provides increased lethal effects against personnel & soft-skin vehicular targets increasing Soldier Survivability on the ground during troops in contact engagements and decreases the required number of rounds to reach the desired lethal effects. FY 2019 continues to support the Technology Maturation and Risk Reduction effort.

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

	FY 2017	FY 2018	FY 2019
Title: Pre Engineering Manufacturing Development Activities	-	2.475	3.859
Description: Pre-Milestone B approval. Technology Readiness Level 6 must be demonstrated.			
FY 2018 Plans: FY 2018 primary activities include conducting an industry day, technology maturation and risk reduction activities. Awards will be made to multiple vendors to develop the critical technologies such as the safe and arm and proximity electronics. These two technologies, and others, will be designed and tested at the sub-system level for integration into the M789 round			
FY 2019 Plans: FY 2019 activities include continuing activities to reduce risk and mature technology with a goal of a Technology Readiness Level 6 demonstration of the ability to select airburst or point detonating (PD) functionality when fired from a M230 ground mounted weapon system. Vendors will continue to develop the critical technologies to be designed and tested at the sub-system level for integration into the M789 round. The main effort in FY 2019 will focus on ammunition and system integration which will culminate with the demonstration of a proximity round fired from a ground mounted weapon.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) XT5 / <i>30mm Anti-Personnel and Counter UAS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
FY 2019 funding required for additional technology maturation ahead of Milestone B.			
Accomplishments/Planned Programs Subtotals	-	2.475	3.859

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
• XT6: <i>30mm Anti-Personnel and Counter-Air - Eng Dev</i>	-	-	0.000	-	0.000	8.996	4.942	4.941	4.940	0.000	23.819

Remarks

D. Acquisition Strategy

The initial development of the Lightweight 30mm (LW30, 30mmx113mm) Airburst cartridge during the Technology Maturation and Risk Reduction (TMRR) phase will occur via competitive prototyping using Other Transaction Authority (OTA) awards to two contractors to demonstrate Technology Readiness Level (TRL) 6. For the first phase of Engineering and Manufacturing Development (EMD), two Full and Open competitive contracts will be awarded. Prior to Developmental Test & Evaluation (DT&E), the Government will down-select to a single contractor for EMD completion followed by a contract for Low Rate Initial Production (LRIP) and two production options.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) XT5 / <i>30mm Anti-Personnel and Counter UAS</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Prototype Design Contractor 1	C/CPFF	TBD : TBD	-	-		0.800		1.000		-		1.000	Continuing	Continuing	-
Prototype Design Contractor 2	C/CPFF	TBD : TBD	-	-		0.800		1.000		-		1.000	Continuing	Continuing	-
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : NJ	-	-		0.225		0.185		-		0.185	Continuing	Continuing	-
Program Manager Apache (PM Apache)	MIPR	Redstone Arsenal : AL	-	-		0.200		0.200		-		0.200	Continuing	Continuing	-
Subtotal			-	-		2.025		2.385		-		2.385	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Armament Research, Development, and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	-		0.450		0.450		-		0.450	Continuing	Continuing	-
Subtotal			-	-		0.450		0.450		-		0.450	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Ammunition Design Engineering Test (DET) 1	C/FFP	TBD : TBD	-	-		-		0.512		-		0.512	Continuing	Continuing	-
Ammunition Design Engineering Test (DET) 2	C/FFP	TBD : TBD	-	-		-		0.512		-		0.512	Continuing	Continuing	-
Subtotal			-	-		-		1.024		-		1.024	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018				
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) XT5 / 30mm Anti-Personnel and Counter UAS				
	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	-	-	2.475		3.859		-		3.859	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) XT5 / <i>30mm Anti-Personnel and Counter UAS</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023										
	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							
Technology Maturation and Risk Reduction (TMRR)					TMRR																														
Contract Award									1 Contract Award																										
Ammo Design Engineering Test (DET) 1													2 DET 1																						
Ammo Design Engineering Test (DET) 2															3 DET 2																				
Material Development Decision (MDD)															4 MDD																				
Milestone B																	5 MS B																		
Engineering and Manufacturing Development (EMD) Phase 1																	EMD Phase 1																		
System Integration Design Engineering Test (DET) 1																			6 SI DET 1																
System Integration Design Engineering Test (DET) 2																					7 SI DET 2														
System Integration Design Engineering Test (DET) 3																					8 SI DET 3														
Engineering and Manufacturing Development (EMD) Down Select																	9 EMD Down Select																		
Engineering and Manufacturing Development (EMD) Phase 2																					EMD Phase 2														
Milestone C																													10 MS C						

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) XT5 / <i>30mm Anti-Personnel and Counter UAS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Maturation and Risk Reduction (TMRR)	1	2018	4	2019
Contract Award	3	2018	3	2018
Ammo Design Engineering Test (DET) 1	2	2019	2	2019
Ammo Design Engineering Test (DET) 2	3	2019	3	2019
Materiel Development Decision (MDD)	4	2019	4	2019
Milestone B	2	2020	2	2020
Engineering and Manufacturing Development (EMD) Phase 1	2	2020	1	2022
System Integration Design Engineering Test (DET) 1	1	2021	1	2021
System Integration Design Engineering Test (DET) 2	3	2021	3	2021
System Integration Design Engineering Test (DET) 3	4	2021	4	2021
Engineering and Manufacturing Development (EMD) Down Select	1	2022	1	2022
Engineering and Manufacturing Development (EMD) Phase 2	1	2022	3	2023
Milestone C	3	2023	3	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603645A / Armored Systems Modernization Adv Dev
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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	-	0.000	32.739	119.395	-	119.395	64.986	85.724	86.964	32.603	0.000	422.411
<i>EV7: Combat Vehicle Prototyping</i>	-	0.000	32.739	119.395	-	119.395	64.986	85.724	86.964	32.603	0.000	422.411

A. Mission Description and Budget Item Justification

Next Generation Combat Vehicle (NGCV) prototyping provides focused investment for development of the combat vehicles in future battlefields. The purpose of this funding is to integrate the next generation of technology enabled capabilities developed in the Science and Technology (S&T) portfolio to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational evaluation/feedback, to determine integration potential across the current Army portfolio of ground vehicles and to develop platform level prototypes

Prototyping allows for aggressive innovation (provides a bridge from S&T investment to vehicle integration and operational use), informs requirements through User Evaluations, ensures requirements are met, mitigates capability gaps and reduces integration risks.

Additional funding in FY 2019 will support working with Industry (via Other Transaction Agreement (OTAs)) on concept development, trade studies, technology maturation/testing, technical/operational/affordability analyses and prototyping and demonstration of combat vehicles (both manned and autonomous) to assess future concepts and designs that integrate emerging S&T advancements to include integration and fusion of data from different sensors and subsystems within the platform and how it will be displayed to the crewman and/or autonomous vehicle operator on the battlefield to improve crew reaction time and platform fightability. Funding will also support acceleration of the TARDEC NGCV 1.0 Prototype.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	32.739	32.743	-	32.743
Current President's Budget	0.000	32.739	119.395	-	119.395
Total Adjustments	0.000	0.000	86.652	-	86.652
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	86.652	-	86.652

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army Date: February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603645A / <i>Armored Systems Modernization Adv Dev</i>
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Change Summary Explanation

Funding increase of \$86.652M in support of Combat Vehicle modernization priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018			
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603645A / <i>Armored Systems Modernization Adv Dev</i>					Project (Number/Name) EV7 / <i>Combat Vehicle Prototyping</i>			
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	
<i>EV7: Combat Vehicle Prototyping</i>	-	0.000	32.739	119.395	-	119.395	64.986	85.724	86.964	32.603	0.000	422.411	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

Next Generation Combat Vehicle Prototyping (CVP) provides focused investment for the development of the next of generation combat vehicles. The purpose of this funding is to integrate advanced technology enabled capabilities developed in the S&T portfolio, demonstrate their ability to meet emerging military needs, develop sub-system and system level prototypes, provide hardware for Soldier operational evaluation/feedback, and determine their integration potential across the current Army portfolio of ground vehicles.

Prototyping allows for aggressive innovation (provides a bridge from Science and Technology (S&T) investment to vehicle integration and operational use), informs requirements through User Evaluations, ensures requirements are met, mitigates capability gaps and reduces integration risks.

Additional funding in FY 2019 will support working with Industry (via OTAs) on concept development, trade studies, technology maturation/testing, technical/operational/affordability analyses, and prototyping and demonstration of combat vehicles (both manned and autonomous) to assess future concepts and designs that integrate emerging Science and Technology advancements to include integration and fusion of data from different sensors and subsystems within the platform and how it will be displayed to the crewman and/or Autonomous vehicle operator on the battlefield to improve crew reaction time and platform fight ability. Funding will also support acceleration of the TARDEC NGCV 1.0 Prototype.

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

	FY 2017	FY 2018	FY 2019
Title: Project Management	-	14.854	19.220
<p>Description: This effort conducts system level ground vehicle advanced concepting, prototyping and demonstration. This effort will partner government organic capabilities and Industry for an iterative process to develop combat vehicle concepts and prototypes in order to inform and stabilize future capability requirements, performance characteristics, and affordability, evaluate and update operational concepts, and reduce future acquisition risk. Activity will include the integration and demonstration of a series of subsystem demonstrators building off of previous investment in ground combat acquisition and science and technology programs along with advanced technologies from Industry and Academia.</p> <p>FY 2018 Plans: Will build off of previous and current investments in Science and Technology and Acquisition efforts (PE?s 0605625, 0604115, 0603005) to further concept development and system level risk reduction for the next generation of combat vehicles. The next generation combat vehicle team (PEO GCS in coordination with RDECOM) will oversee a continued public private partnership</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A / <i>Armored Systems Modernization Adv Dev</i>	Project (Number/Name) EV7 / <i>Combat Vehicle Prototyping</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>between organic government and private industry, monitoring and tracking technical progress related to the development concepts and designs for the next generation of combat vehicles. It will mature system level concepts and designs to integrate S&T developed advanced ground vehicle subsystem technologies such as active protection, powertrains, armors, and situational awareness suites into a system level experimental prototype. It will conduct experimental demonstration of a closed hatch Infantry Fighting Vehicle and split-squad operations. It will leverage organic early synthetic prototyping capability to conduct soldier-in-the-loop virtual simulations of future combat vehicle concepts to assess next generation capabilities and conduct system level performance trades. The team will conduct analysis based on all the data currently available from the Future Fighting Vehicle and Squad Centric Mounted Maneuver (SCMM) efforts to inform investments in FY19 and beyond.</p> <p>FY 2019 Plans: Analyze results of completed experimental demonstrations in support of next generation combat vehicles (both manned and autonomous) to include the Mission Enabling Technologies - Demonstrator (MET-D) demonstration of closed hatch Infantry Fighting Vehicle (IFV) and split-squad operations and apply lessons learned to mature the system level concepts and designs for integration of the S&T developed advanced ground vehicle subsystem technologies into a system level experimental prototype. Will continue to conduct soldier-in-the-loop virtual simulations of future combat vehicle concepts to assess next generation capabilities and conduct system level performance trades. Will analyze system concepts and designs to identify long-lead hardware in preparation for procurement prior to system build and physical integration. Current prototype build by TARDEC will be accelerated for delivery by FY 2020. Will initiate work on data fusion technology based on multiple sensor inputs for use in target identification and tracking, surveillance, and autonomous control.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Increase to FY 2019 is for additional Program Management support.</p>				
<p>Title: Test & Evaluation</p> <p>FY 2018 Plans: Test & Evaluation includes but not limited to safety, integration, and demonstration.</p> <p>FY 2019 Plans: Test & Evaluation includes but not limited to safety, integration, and demonstration.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Test & Evaluation increases in FY 2019 for safety, integration, and demonstration.</p>		-	7.981	8.000
<p>Title: Other</p> <p>Description: Funding provided support software development, integration and support services, hardware, and vehicle electronics architecture subsystems.</p>		-	6.904	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A / <i>Armored Systems Modernization Adv Dev</i>	Project (Number/Name) EV7 / <i>Combat Vehicle Prototyping</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>FY 2018 Plans: Other efforts include software integration library (SIL), crew station SIL, power and data architecture, powerpack components, software support and development. The efforts also include integration and support services for the Squad Centric Mounted Maneuver (SCMM) project; ground movement target indicator radar, unmanned aerial system sensor, hardware for the head mount display subsystem, fabricates remaining hardware in support of SCMM vehicle integration, and hardware and support for the SCMM autonomy subsystem and vehicle electronics architecture subsystem.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Other decreases to zero in FY 2019 however it is included in the Prototyping Acceleration.</p>				
<p>Title: Modeling & Simulation</p> <p>Description: The modeling and simulation effort is to assess operational needs and operational employment by using the Maneuver Battle lab at Fort Benning and One Semi-Automated Forces (OneSAF) modeling. Results provide the analytical underpinnings to support development of requirements.</p> <p>FY 2018 Plans: The modeling and simulation effort is to assess operational needs and operational employment by using the Maneuver Battle lab at Fort Benning and One Semi-Automated Forces (OneSAF) modeling. Results provide the analytical underpinnings to support development of requirements.</p> <p>FY 2019 Plans: Will continue to assess operational needs and operational employment through modeling and simulation by using the Maneuver Battle lab at Fort Benning and One Semi-Automated Forces (OneSAF) modeling. Modeling and simulation results will continue to support the development of requirements for future systems. The modeling and simulation outcomes coupled with planned technology proto-type demonstrations and user evaluations will provide the combat developer an analytical base to support the development and refinement of requirements.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Modeling & Simulation increase in FY 2019 due to the increase in demonstrations.</p>		-	3.000	6.000
<p>Title: Prototyping Acceleration</p> <p>Description: Accelerate prototyping (both organic and from Industry) for combat vehicles and internal fusion of data from different sensors and how it will be displayed and used by manned and autonomous systems. Demonstrations from the prototypes will help to inform requirements for the NGCV platform(s) and how they will operate.</p> <p>FY 2019 Plans:</p>		-	-	86.175

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A / <i>Armored Systems Modernization Adv Dev</i>	Project (Number/Name) EV7 / <i>Combat Vehicle Prototyping</i>

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

	FY 2017	FY 2018	FY 2019
TARDEC will take their existing contract using the OTA and accelerate the IFV build in order to deliver a first prototype by 1Q FY2021. The prototype will utilize latest off-the shelf technologies and have the capability to upgrade to the Combat Vehicle Prototyping (CVP) technologies as they become available. Acceleration of the contract will require modification of the current contract.			
NGCV Cross Functional Team (CFT)/PM will use the OTA to submit a call for white papers to Industry for concepts that will show technologies that will improve a combat vehicle (IFV or Tank) in the areas of mobility, survivability, lethality, situational awareness, sensor fusion and demonstrate a path to autonomy. The white papers will be used to award 1 to 2 contracts to build a prototype which will be delivered by 1Q FY2021. Information from the prototypes (both organic and from Industry), along with the parallel modeling and simulation will inform the development of the NGCV requirements.			
Demonstrate Sensor Fusion/Crew Station requirements for manned and unmanned systems. Will continue to provide integration support and technology procurement for the software system integration laboratory (SIL). Provide integration support and user evaluation for the crew station SIL. These SILs will allow the integration team to simulate integrated system functionality prior to the actual physical integration of the system. Work performed in these SILs will be critical to the successful mitigation of risk for the integrated systems demonstration by identifying any system integration-related errors as early as possible. Identifying errors early in the integration process will allow the team to develop solutions in a timely and effective manner. Will continue to mature the system level integration of the powerpack (engine, transmission, integrated starter generator, exhaust, air inlet, and thermal management system) along with working new projects in the areas of sensor fusion, which may include, but not limited to, data inputs from Global Positioning System (GPS), Light Detection and Raging (LIDAR), SOund Navigation And Ranging (SONAR), RADio Detection And Ranging (RADAR), optical Infrared, UltraViolet (UV), etc. Will procure specialty tooling and long-lead items, and will continue to provide software support that is needed for system integration, for the accelerated demonstration.			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Prototyping Acceleration increases in FY 2019 to include Next Generation Combat Vehicle, Prototype with Industry and Sensor Fuse/Crew/SIL.			
Accomplishments/Planned Programs Subtotals	-	32.739	119.395

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0604115A: PE 0604115A	14.423	-	0.000	-	0.000	-	-	-	-	0.000	14.423

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A / <i>Armored Systems Modernization Adv Dev</i>	Project (Number/Name) EV7 / <i>Combat Vehicle Prototyping</i>

D. Acquisition Strategy

Competitive contracts will be awarded. This project will continue to exercise competitively awarded contracts using best value source selection procedures.

E. Performance Metrics


N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 4				PE 0603645A / Armored Systems Modernization Adv Dev				EV7 / Combat Vehicle Prototyping								
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
NGCV Contract(s)	C/TBD	TBD : TBD	-	-		5.671	Oct 2017	30.000	Mar 2019	-		30.000	Continuing	Continuing	Continuing	
SCMM Phase 1 Contracts	C/TBD	TBD : TBD	-	-		1.233	Oct 2017	-		-		-	Continuing	Continuing	Continuing	
Prototyping with Industry	C/TBD	TBD : TBD	-	-		-		30.000	Jul 2019	-		30.000	Continuing	Continuing	Continuing	
Sensor Fuse/Crew/SIL	C/TBD	TBD : TBD	-	-		-		26.175	Jul 2019	-		26.175	0.000	26.175	-	
Subtotal			-	-		6.904		86.175		-		86.175	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
PMO/PEO Support	MIPR	PM/PEO : Warren, MI	-	-		14.854	Dec 2017	19.220	Dec 2018	-		19.220	0.000	34.074	-	
Subtotal			-	-		14.854		19.220		-		19.220	0.000	34.074	N/A	
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
SCMM User Evaluation	C/TBD	TBD : TBD	-	-		7.981	Oct 2017	-		-		-	Continuing	Continuing	Continuing	
Modeling & Simulation	C/TBD	TBD : TBD	-	-		3.000	Jan 2018	6.000	Mar 2019	-		6.000	Continuing	Continuing	Continuing	
Developmental testing	C/TBD	TBD : TBD	-	-		-		8.000	Jul 2019	-		8.000	Continuing	Continuing	Continuing	
Subtotal			-	-		10.981		14.000		-		14.000	Continuing	Continuing	N/A	
Project Cost Totals			-	-		32.739		119.395		-		119.395	Continuing	Continuing	N/A	
Remarks																

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A / Armored Systems Modernization Adv Dev	Project (Number/Name) EV7 / Combat Vehicle Prototyping	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
SCMM Phase 1: Modified Bradley Fire Team IFV																												
Live Experiment													 Live Experiment															
Operational Modeling																												
Requirements Development																												
Operational Modeling/O&O																												
Technologies Assessments and prioritization																												
Prototyping Phase																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A / <i>Armored Systems Modernization Adv Dev</i>	Project (Number/Name) EV7 / <i>Combat Vehicle Prototyping</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SCMM Phase 1: Modified Bradley Fire Team IFV	1	2018	4	2018
Live Experiment	1	2019	1	2019
Operational Modeling	1	2018	4	2018
Requirements Development	1	2020	4	2022
Operational Modeling/O&O	3	2019	4	2021
Technologies Assessments and prioritization	1	2018	4	2018
Prototyping Phase	3	2018	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>
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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	-	13.607	13.157	8.746	3.000	11.746	7.402	8.640	9.036	9.235	0.000	72.823
610: <i>Food Adv Development</i>	-	5.095	6.548	4.599	-	4.599	4.110	4.223	4.175	4.972	0.000	33.722
C08: <i>Rapid Equipping Force</i>	-	6.639	6.162	2.799	3.000	5.799	2.794	2.790	2.786	2.781	0.000	29.751
EL1: <i>Army Field Feeding Programs</i>	-	1.873	0.447	1.348	-	1.348	0.498	1.627	2.075	1.482	0.000	9.350

A. Mission Description and Budget Item Justification

This Program Element (PE) supports component development and prototyping for organizational equipment, improved individual clothing and equipment that enhance Soldier battlefield effectiveness, survivability, and sustainment. This PE also supports the component development and prototyping of joint service food and combat feeding equipment designed to reduce logistics burden.

B. Program Change Summary (\$ in Millions)

	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>
Previous President's Budget	10.506	13.157	8.640	-	8.640
Current President's Budget	13.607	13.157	8.746	3.000	11.746
Total Adjustments	3.101	0.000	0.106	3.000	3.106
• Congressional General Reductions	-0.006	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	3.500	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.393	-			
• Adjustments to Budget Years	-	-	0.106	3.000	3.106

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: C08: *Rapid Equipping Force*

Congressional Add: *Congressional Add Row*

	FY 2017	FY 2018
Congressional Add Subtotals for Project: C08	3.500	-
Congressional Add Totals for all Projects	3.500	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army Date: February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>
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Change Summary Explanation

FY2019 OCO Increase of \$3.000M - Army Rapid Equipping Force OCO requirement.
FY2017 OCO Increase of \$3.500M - Army Rapid Equipping Force OCO requirement.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>
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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
610: <i>Food Adv Development</i>	-	5.095	6.548	4.599	-	4.599	4.110	4.223	4.175	4.972	0.000	33.722
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project provides for the advanced component development and prototyping of Joint Service combat ration components/platforms and field feeding equipment designed to improve warfighter performance and reduce the logistics burden of subsistence support. Efforts funded in this Project support all four Services, the Special Operations Command, and the Defense Logistics Agency. The Army serves as the Executive Agent for this Department of Defense (DoD) program, with oversight and coordination provided by the DoD Combat Feeding Research and Engineering Board as required by DoD Directive (DoDD) 3235.02E. Centralized execution of the DoD Combat Feeding Research and Engineering Program (CFREP) with Joint Service review and approval eliminates unnecessary duplication of efforts across the Services and maximizes use of common materiel solutions. Prototypes validated within this effort transition to Program Element (PE) 0604713A/Project 548 for System Development and Demonstration.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Title: Fielded Individual Ration Improvement Project (FIRIP)</p> <p>Description: Continuous product improvement of project for the Meal, Ready to Eat (MRE) through the advanced development of novel nutrition, processing and packaging technologies to improve operational effectiveness and improve logistics.</p> <p>FY 2018 Plans: Continue to conduct in-house product development of food components and identify suitable COTS/NDI candidate items for fielded individual operational rations (MRE 2021 date of pack) to enhance warfighter acceptability, increase consumption and improve nutritional intake. Conduct pilot scale in-house production to support engineering design, technology insertion, and commercial producibility. Develop, integrate and validate state-of-the art science and technology, food processing and primary/secondary packaging innovations into individual ration platforms to increase operational effectiveness. Optimize food component processing and packaging to introduce targeted items/capabilities into individual ration platforms for enhanced acceptability, nutrition and performance. Transition to 6.5 for operational testing.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>	0.895	0.663	-	-	-
<p>Title: Assault/Special Purpose Ration Improvement Project (ASPIP)</p>	0.519	0.463	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: Continuous product improvement of special purpose rations through the advanced development of novel nutrition, processing and packaging technologies to improve operational effectiveness and improve logistics. Special purpose rations include the Meal, Cold Weather/Long Range Patrol (MCW/LRP), First Strike Ration (FSR), and Modular Operational Ration Enhancement (MORE).</p> <p>FY 2018 Plans: Continue to identify COTS/NDI components for the MCW/LRP, FSR and/or MORE to enhance acceptability, variety, consumption and nutritional value of scenario-specific combat rations based on user feedback, focus groups, emerging products and technologies and user requirements. Conduct accelerated and long term storage studies on candidate components. Transition to 6.5 for operational testing.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>					
<p>Title: Fielded Group Ration Improvement Project (FGRIP)</p> <p>Description: Continuous product improvement project to update/improve group ration components, menus, and packaging by integrating state-of-the-art military/commercial packaging and technology base transitions. The family of Unitized Group Rations (UGRs) includes the Unitized Group Ration - Heat & Serve (UGR-H&S), Unitized Group Ration - Express (UGR-E), Unitized Group Ration - A (UGR-A), and Unitized Group Ration - M (UGR-M).</p> <p>FY 2018 Plans: Continue efforts to update/improve components, menus and packaging to increase consumption and overall nutritional intake of the family of Unitized Group Rations for UGR-A, M, E and H&S future year menus. Identify COTS/NDIs and develop new food components in-house, conduct in-house testing, down-select items and develop test menus for warfighter evaluation. Develop, integrate and validate state-of-the-art science and technology, food processing and primary/secondary packaging innovations into group ration platforms to increase operational effectiveness, functionality and improve logistics. Transition to 6.5 for operational testing.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>	0.831	1.062	-	-	-
<p>Title: US Navy Standard Core Menu (NSCM) Continuous Product Improvement Project</p>	0.344	0.463	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: Provide recommendations to the Naval Supply Systems Command (NAVSUP) for upgrading/improving Navy Standard Core Menu (NSCM) components by introducing new preparation techniques to enhance menu acceptance and effectiveness while reducing labor requirements.</p> <p>FY 2018 Plans: Continue to identify and validate COTS/NDI candidate enhancements to the Navy Standard Core Menu (NSCM). Test and evaluate new products and techniques using Navy Galley equipment. Provide recommendations for improving menu components by introducing new commercial items and state-of-the-art food preparation and feeding techniques to enhance menu acceptance and reduce labor requirements. Transition product summaries and results/recommendation to NAVSUP for adoption and procurement.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>					
<p>Title: Block Upgrades and Operational Improvements for Expeditionary Field Feeding Equipment.</p> <p>Description: Eliminate the sole sourcing of tray ration heater component parts. Reduce overall water consumption through the use of non-immersive cooking technologies and more efficient ware-washing equipment. Increase Kitchen flexibility through appliance upgrades. To reduce the overall fuel consumption of Expeditionary Field Feeding Equipment through enhanced combustion technologies.</p>	0.351	-	-	-	-
<p>Title: Multi-Purpose Individual Heating Technology (MIT)</p> <p>Description: Develop a disposable, lightweight heating mechanism as a low-cost component of the Meal, Cold Weather/Long Range Patrol (MCW/LRP) to facilitate preparation of operational rations in extreme environments with reduced resource requirements and increased ease of use.</p> <p>FY 2018 Plans: Evaluate MIT prototypes transitioned to 6.4. Conduct in-house test and evaluation (T&E), and transition results to 6.5 for Engineering and Manufacturing Development.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>	0.315	0.496	-	-	-
<p>Title: Joint Intuitive Multi-function Kitchen Equipment (JIMKE)</p>	0.181	0.730	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: Reduce logistics burden associated with life cycle management of Navy (USN), Air Force (USAF) and Marine Corps (USMC) foodservice equipment. Integrate diagnostic technologies to predict maintenance, reduce labor associated with troubleshooting equipment in the field, and increase mean time between failures (MTBF).</p> <p>FY 2018 Plans: Complete in-house prototype test and evaluation, and transition to 6.5 for operational testing.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>					
<p>Title: Navy Galley and Scullery Upgrades</p> <p>Description: Continuously modernize foodservice operations by adding capabilities to provide optimized feeding, standardizing foodservice equipment assets fleet-wide, improving space utilization, and facilitating the continued use of the NSCM. Design, processes and equipment insertions will be implemented on legacy platforms during overhaul periods and during the new construction process on future vessels.</p> <p>FY 2018 Plans: Identify advanced equipment technologies to support existing and new ship class designs to support the Galley and Scullery operations. Conduct in-house testing of equipment recommended by Navy subject matter experts. Transition T&E reports to USN.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>	0.445	0.680	-	-	-
<p>Title: Greywater Recycling for the Basic Expeditionary Airfield Resources (BEAR) Kitchen Systems</p> <p>Description: Leverage NDI and COTS greywater filtration technologies to reduce operating and support (O&S) costs for the basic expeditionary airfield resources (BEAR) kitchen system.</p>	0.337	-	-	-	-
<p>Title: Modular Integrated Kitchen System (MIKS)</p> <p>Description: Design a standardized mounting system for all Galley equipment to significantly reduce technical labor skills required to complete deck modifications. Modular Integrated Kitchen System (MIKS) will standardize electrical and water requirements, enhance procurement options, decrease operating and support (O&S) costs, and increase the speed of installing new technologies into the Galley/Scullery areas.</p>	0.319	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Title: Defense Logistics Agency (DLA)</p> <p>Description: Support management of the Department of Defense (DoD) Electronic Document Access (EDA) and Wide Area Workflow (WAWF) programs.</p> <p>FY 2018 Plans: Fund Defense Logistics Agency (DLA) Document Services to support management of the DoD EDA and WAWF programs.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Final year of this effort is FY 2018.</p>	0.558	0.558	-	-	-
<p>Title: Tray Ration Heater ? Improved (TRH-I)</p> <p>Description: Develop an updated and compact Tray Ration Heater to meet the requirements of the smaller, up-armored HMMWV cargo beds. Reduce the overall weight, improve man-portability, heat transfer efficiency, thermal storage efficiency, and reduce water consumption. Meet USMC approved Statement of Need requirement for a Modernized Tray Ration Heat System.</p> <p>FY 2018 Plans: Develop TRH-I SOW and technical objectives. Prepare contract documentation and award TRH-I development contract.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.</p>	-	0.495	-	-	-
<p>Title: Inflatable Refrigerated Space (IRefS)</p> <p>Description: Develop a pallet sized, rapidly deployable, air deliverable field refrigeration system for safe storage of UGR-A rations to units located in austere environments with little to no ability to obtain rigid refrigerated containers.</p> <p>FY 2018 Plans: Develop SOW with objective and threshold performance criteria and award contract to design and fabricate a high fidelity IRefS prototype.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p>	-	0.610	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Effort as titled ends in FY 2018.					
Title: Navy Mobile Feeding Galley Description: Develop a mobile feeding system that is equipped with innovative cooking technology. The platform will have the capability to produce a rotating menu of fresh and healthy cuisine that will appeal to the millennial generation of sailors. FY 2018 Plans: Conduct market research to define equipment needs. Prepare SOW and contract documents for modified or prototype mobile system and award contract. FY 2018 to FY 2019 Increase/Decrease Statement: Effort as titled ends in FY 2018.	-	0.328	-	-	-
Title: Joint Service Combat Ration Advanced Development Description: This effort matures and integrates combat ration technologies and prototypes that enable warfighter maneuver, readiness and effectiveness during highly mobile, dispersed operations. Technologies are transitioned from PE 0603001A/Project C07 to provide combat rations and components with improved capabilities including improved warfighter physical and cognitive performance through optimized nutrition and a reduced logistics burden through weight and cube reduction. FY 2019 Base Plans: Will mature and integrate applied nutrition, food engineering, and food packaging innovations into ration platforms to increase operational effectiveness; identify suitable COTS/NDI candidate items to enhance warfighter acceptability, increase consumption and improve nutritional intake; conduct pilot scale in-house production to support engineering design, technology insertion, and commercial producibility; conduct accelerated storage studies to validate candidate components meet or exceed shelf-life requirements; develop test menus for warfighter evaluations; and transition validated prototypes to 6.5 for operational testing. FY 2018 to FY 2019 Increase/Decrease Statement: Lines of effort previously reported separately (i.e., FIRIP; ASIPI; FGRIP and MIT) have been merged into a single line starting in FY 2019 titled ?Joint Service Combat Ration Advanced Development?.	-	-	1.751	-	1.751
Title: Joint Service Field Feeding Equipment and Menu Development	-	-	2.848	-	2.848

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: This effort matures and integrates field feeding equipment technologies and prototypes in support of the Navy, Air Force, and Marine Corps that reduce the logistics burden, improve efficiency, and decrease operation and support costs as directed by the DoD CFREB. This effort also conducts test and evaluation (T&E) on Navy Standard Core Menu components and preparation techniques to enhance efficiency through standardization across the fleet and reduce labor requirements.</p> <p>FY 2019 Base Plans: Will conduct T&E of prototype equipment with diagnostic and predictive capabilities to decrease sustainment life-cycle costs and decrease equipment downtime; conduct design reviews and fabricate prototypes that improve the heating efficiency of rations while reducing overall weight, cube and total lifecycle costs; design and fabricate a rapidly deployable field refrigeration prototype to reduce resupply requirements to units in austere locations; test and evaluate new products and food preparation techniques to enhance menu acceptance and reduce labor requirements; and transition prototypes to PE 0604713A/Project 548 for System Development and Demonstration.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Lines of effort previously reported separately (i.e., NSCM Continuous Product Improvement Project; Block Upgrades and Operational Improvements for Expeditionary Field Feeding Equipment; JIMKE, Navy Galley and Scullery Upgrades; MIKS, TRH-I, IRefS and Navy Mobile Feeding Galley) have been merged into a single line starting in FY 2019 titled ?Joint Service Field Feeding Equipment and Menu Development?.</p>					
Accomplishments/Planned Programs Subtotals	5.095	6.548	4.599	-	4.599

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
• 548: <i>Mil Subsistence Sys</i>	0.730	0.700	1.093	-	1.093	1.893	1.942	1.817	1.531	0.000	9.706

Remarks

D. Acquisition Strategy

Project development will transition to Engineering & Manufacturing Development and production.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Combat Feeding Program Management	Allot	RDECOM, NSRDEC, Natick, MA : Natick, MA	5.785	0.574	Oct 2016	0.707	Oct 2017	0.511	Oct 2018	-		0.511	Continuing	Continuing	Continuing
DLA Bill Pay	TBD	Various : Various	1.140	0.410	Oct 2016	0.586	Oct 2017	-		-		-	0.000	2.136	-
Subtotal			6.925	0.984		1.293		0.511		-		0.511	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Joint Service Rations and Combat Feeding Equipment	Various	Various : Various	26.742	3.759	Oct 2016	4.704	Oct 2017	3.656	Oct 2018	-		3.656	Continuing	Continuing	Continuing
Subtotal			26.742	3.759		4.704		3.656		-		3.656	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Joint Service Rations and Combat Feeding Equipment	Allot	RDECOM, NSRDEC, Natick, MA : Natick, MA	-	0.352	Oct 2016	0.551	Oct 2017	0.432	Oct 2018	-		0.432	Continuing	Continuing	Continuing
Subtotal			-	0.352		0.551		0.432		-		0.432	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			33.667	5.095	6.548	4.599	-	4.599	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Evaluate combat ration enhancements and transition to SDD for C	[Redacted]																											
Provide USN w/CPI, evaluations and menu development to supp	[Redacted]																											
Conduct in-house T&E of MIT heating prototypes for MCW	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Dem/Val on Block Upgrade Improvements to support modification	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Complete development of MIKS prototype for USN and transition	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
ID and evaluate advanced galley/scullery equipment for the USN	[Redacted]																											
Conduct Dem/Val of Galley/Scullery equipment and transition to S	[Redacted]																											
ID and evaluate prototype greywater system for the USAF	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Conduct in-house T&E of JSERCS prototype for BEAR Type I kitch	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Procure BEAR Type II kitchen for in-house T&E and transition to SDD for OT&E	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Award dev contract and obtain Tray Ration Heater - Improved prototypes for USMC	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
ID and procure enabling technologies for rapidly deployable refrigeration system	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Identify and procure JIMKE prototypes	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Conduct in-house T&E of mobile feeding galley and transition to SDD for OT&E																												
Award contract for build of prototype mobile galley feeding system for USN																												
Conduct in-house T&E of JIMKE intuitive equipment and transition to SDD for OT&E																												
Award contract to fabricate IRefS prorotype and conduct in-house T&E																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) 610 / <i>Food Adv Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Evaluate combat ration enhancements and transition to SDD for OT&E	1	2017	4	2023
Provide USN w/CPI, evaluations and menu development to support NSCM upgrades	1	2017	4	2023
Conduct in-house T&E of MIT heating prototypes for MCW	1	2017	4	2018
Dem/Val on Block Upgrade Improvements to support modification of USMC FSE	1	2017	4	2017
Complete development of MIKS prototype for USN and transition to SDD for OT&E	1	2017	4	2017
ID and evaluate advanced galley/scullery equipment for the USN	1	2017	4	2021
Conduct Dem/Val of Galley/Scullery equipment and transition to SDD for OT&E	1	2017	4	2021
ID and evaluate prototype greywater system for the USAF	1	2017	4	2017
Conduct in-house T&E of JSERCS prototype for BEAR Type I kitchen for USAF	1	2017	1	2018
Procure BEAR Type II kitchen for in-house T&E and transition to SDD for OT&E	1	2018	3	2018
Award dev contract and obtain Tray Ration Heater - Improved prototypes for USMC	1	2018	3	2018
ID and procure enabling technologies for rapidly deployable refrigeration system	1	2018	4	2018
Identify and procure JIMKE prototypes	1	2018	2	2019
Conduct in-house T&E of mobile feeding galley and transition to SDD for OT&E	1	2019	1	2020
Award contract for build of prototype mobile galley feeding system for USN	1	2018	1	2019
Conduct in-house T&E of JIMKE intuitive equipment and transition to SDD for OT&E	2	2019	4	2020
Award contract to fabricate IRefS prorotype and conduct in-house T&E	1	2019	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

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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
<i>C08: Rapid Equipping Force</i>	-	6.639	6.162	2.799	3.000	5.799	2.794	2.790	2.786	2.781	0.000	29.751
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Equipment mix and configuration may change based on changes in operational environment and circumstances. Congressional add in FY 2017 listed as "program increase"

A. Mission Description and Budget Item Justification

The Rapid Equipping Force (REF) supports Combatant Command (COCOM)/Army Service Component Command (ASCC) based on emerging rapid equipment requirements. The REF is an enduring organization (Base funded) per Memorandum, Under Secretary of the Army, 30 Jan 2014, subject: Implementation Plan for Stabilization of the Rapid Equipping Force (REF).

The REF is the Army's Quick Reaction Capability (QRC) with the ability to acquire, integrate and sustain Commercial-Off-The Shelf (COTS), Government Off-The-Shelf (GOTS), Non-Developmental Item (NDI), and non-standard equipment solutions to meet urgent combat requirements for globally employed forces. It inserts selected future force technologies, capabilities, and surrogate materiel solutions into deployed, deploying, select-prepared to deploy, and transformational forces for operational evaluation, assessment, and evolutionary development. The REF assesses the provided capabilities to improve future solutions to inform materiel development for the future Army capability requirements and to potentially transition the capability to an Army acquisition program.

The REF bridges the gap between the Army's traditional acquisition process and immediate equipping needs. The REF pursues tangible solutions that can be equipped rapidly with a goal of 180 days. The REF focuses on finding immediate and effective game-changing capabilities to increase Soldier Readiness, effectiveness, protection, and lethality in any operational environment. The REF 10-Liner process provides the ability to react quickly to an ever-changing enemy who changes in days and months, not years in a complex world. The REF coordinates with the COCOMs/ASCCs in theater to fully understand their urgent needs, for which the REF acquisition capability may identify, procure, deliver, and sustain solutions to the deployed units. Although the REF works directly with Operational Commanders at all levels, it focuses on Brigade level and below to equip solutions to identified capability gaps.

The Army Acquisition Executive designated Program Executive Office (PEO) Soldier as the Milestone Decision Authority (MDA) to institutionalize the acquisition authorities in support of the REF and to provide proper acquisition oversight while enhancing visibility of these efforts. The MDA will ensure flexibility and speed focused on the Soldier's needs serviced by the dedicated REF Program Management Office (PMO). This establishes a formal acquisition reporting chain that leverages existing reporting venues to ensure appropriate Assistant Secretary of the Army (Acquisition, Logistics and Technology) (ASA(ALT)) visibility, oversight, and direction.

The REF capabilities cross all Warfighter Functions:

1. Mission Command
2. Movement and Maneuver

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

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- 3. Intelligence
- 4. Fires
- 5. Sustainment
- 6. Protection

The REF FY19 RDT&E request is \$2.799 million (Base) and \$3.000 million (OCO) and is for system integration, testing, and evaluation to support project requirements.

The RDT&E funding also provides the REF the flexibility to invest in near-term, and innovative solutions. RDT&E funds are necessary in the majority of all REF projects. Most importantly, REF requires RDT&E funds to conduct safety certification (testing) for non-standard equipment before it is equipped to the Soldier. This critical requirement exists to ensure that REF-provided equipment is safe for Soldiers to use and that any risks are identified and documented. The REF also requires RDT&E funds to integrate several different COTS/GOTS and NDI technologies into one capability that solves the tougher and more complex problems. RDT&E funds maybe used to further develop high (>6) Technology Readiness Level (TRL) systems or advanced technologies in conjunction with industry and Other Governmental Agencies (OGAs). Frequently, these technologies only need small amounts of funding to help them achieve a maturity level that is suitable to solve deployed U.S. Army Forces problems.

The REF requires RDT&E funds to modify, test, and evaluate existing technologies that were developed for one purpose, however may be suitable to solve another problem. REF will also fund deliberate projects in support of technology-solution-scouting to meet anticipated Army needs and to mitigate operational gaps. These efforts measure and identify current technologies, and provide information to better inform Army Training and Doctrine Command (TRADOC) and other communities of interest, with the intent of enlightening future Army requirements. Example efforts that may require RDTE include the following projects: Tactical Satellite Communications (SATCOM) and communications systems; tactical and small Combat Out Post/Forward Operating Base (COP/FOB) Intelligence, Surveillance, and Reconnaissance (ISR) and Force Protection systems; Counter Unmanned Aerial Systems (CUAS); Electronic Warfare (EW) systems; Non-Tactical Vehicles (NTV); Persistent Duration UAS, and Subterranean (SubT) Operations.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Rapid Equipping Force	3.139	6.162	2.799	3.000	5.799
Description: Funding is provided for the following effort.					
FY 2018 Plans: The Rapid Equipping Force (REF) partners with Army Service Component Command (ASCC) forces and Army SOF community to perform DS to globally deployed Soldiers and regionally aligned BCTs. The REF anticipates increased uncertainty regarding the future of OIR and other operations in the Central Command (CENTCOM) Area of Responsibility (AOR) requiring additional flexibility to develop technological solutions supporting the reduced numbers of Soldiers operating globally in order to fill force protection gaps in the face of a smaller and more lethal terrorism threat. The REF expects to continue our engagement with the ASCCs in order to address					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>capability gaps generated by geographical and environmental constraints and improve our understanding of evolving threats and operating conditions within the respective ASCC areas of operations. The REF also expects to play a much more deliberate role in providing support to the Global Response Force (GRF) as they prepare for a wider range of response missions. In accordance with REF's participation in the Office of Secretary of Defense (OSD) led quick reaction capability effort, the Army determined the REF would provide the Army's warm base capability at ~600 (Base/OCO) requirements in FY18 and beyond.</p> <p>For FY18 the REF projects ~600 (Base/OCO) requirements in the following REF Warfighter Functions:</p> <ol style="list-style-type: none"> 1. Mission Command: \$93K (15.06%) 2. Movement and Maneuver: \$186K (29.95%) 3. Intelligence: \$74K (11.98%) 4. Fires: \$6K (1.09%) 5. Sustainment: \$86K (13.97%) 6. Protection: \$172K (27.95%) <p>FY18 funds for projects in the amount of \$617K (10% of budget); breakout is based on the FY16 requirements trend.</p> <p>The REF anticipates ATEC testing and evaluation cost of \$5.545 million. The REF requires RDT&E funds to test technologies in order to ensure suitability and safety before equipping the Soldier ? any modified Commercial-Off-The-Shelf (COTS), Government-Off-The-Shelf (GOTS) and Non-Developmental (NDI) item has to be tested.</p> <p>FY 2019 Base Plans: The REF partners with ASCC forces and Army SOF community to support globally deployed Soldiers and regionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding the future of OIR and other operations in the CENTCOM AOR requiring additional flexibility to develop technological solutions supporting the reduced numbers of Soldiers operating globally in order to fill force protection gaps in the face of a lethal terrorism threat. The REF expects to continue our engagement with the ASCCs to address capability gaps generated by geographical and environmental constraints. Conversely, the REF will increase its understanding of evolving threats and operating conditions within the respective ASCC areas of operations. The REF also expects to play a much more deliberate role in providing support to the GRF as they prepare for a wider range of response missions. In accordance with REF's participation in the Office of Secretary of Defense</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) C08 / <i>Rapid Equipping Force</i>
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>(OSD) led quick reaction capability effort, the Army determined the REF would provide the Army's warm base capability at ~600 requirements in FY19 and beyond.</p> <p>For FY19 the REF projects ~495 (Base/OCO) requirements in the following REF Warfighter function areas.</p> <ol style="list-style-type: none"> 1. Mission Command: \$ 56K (10.06%) 2. Movement and Maneuver: \$93K (16.56%) 3. Intelligence: \$129K (23.05%) 4. Fires: \$2K (.32%) 5. Sustainment: \$89K (15.91%) 6. Protection: \$191 (34.10%) <p>The FY19 funds for projects in the amount of \$560K (20% of Budget); breakout is base on the FY17 requirements trend.</p> <p>The REF anticipates ATEC testing and evaluation cost of \$2.239 million. The REF requires RDT&E funds to test technologies in order to ensure suitability and safety before equipping the Soldier - any modified COTS/GOTS/ NDI item has to be tested.</p> <p><i>FY 2019 OCO Plans:</i> The FY19 OCO funding is required to support emerging requirements to meet capability gaps in Operation Enduring Freedom (OEF), Operation Inherent Resolve (OIR), Horn-of-Africa (HOA), and all OCO funded operations/regions.</p> <p>For FY19 the REF projects ~495 (Base/OCO) requirements in the following War Fighter Functions:</p> <ol style="list-style-type: none"> 1. Mission Command: \$60K (10.06%) 2. Movement and Maneuver: \$99K (16.56%) 3. Intelligence: \$138K (23.05%) 4. Fires: \$2K (.32%) 5. Sustainment: \$95K (15.91%) 6. Protection: \$206K (34.10%) 					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
The FY19 funds for projects in the amount of \$600K (20% of Budget); breakout is base on the FY17 requirements trend.					
The REF anticipates ATEC testing and evaluation cost of \$2.400 million. The REF requires RDT&E funds to test technologies in order to ensure suitability and safety before equipping the Soldier - any modified COTS/GOTS/NDI item has to be tested.					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Decrease in funding from FY18 to FY19 is due to economic adjustments.					
Accomplishments/Planned Programs Subtotals	3.139	6.162	2.799	3.000	5.799
	FY 2017	FY 2018			
<i>Congressional Add:</i> Congressional Add Row	3.500	-			
<i>FY 2017 Accomplishments:</i> N/A					
Congressional Adds Subtotals	3.500	-			

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
• M80101: <i>Rapid Equipping Soldier Support Equipment</i>	30.503	13.500	9.879	18.000	27.879	9.878	9.878	9.879	9.880	0.000	111.397

Remarks

D. Acquisition Strategy

The Rapid Equipping Force (REF) harnesses current and emerging technologies to provide rapid solutions to the urgently required capabilities of U.S. Army Forces employed globally. The REF focus is on rapidly placing capabilities into Soldiers' hands. This mission is accomplished in one of two ways: 1) rapidly adapting COTS/GOTS/NDI equipment to meet operational needs, and 2) developing emerging deployable capability via interaction with research and development organizations and academia. All capabilities are safety tested prior to insertion into operational environments. Training and sustainment are provided for every capability until it is transitioned to an approved acquisition program or terminated through an approved Army process. Operational assessments are conducted to provide feedback in support of Army requirements generation and future capability development. REF capabilities routinely serve as a bridge to specific ONS, JUONS, and JEONS gaps to meet urgent operational requirements.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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<u>E. Performance Metrics</u> N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) C08 / <i>Rapid Equipping Force</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Mission Command	C/FFP	Various : Various	-	0.100		0.093		0.056		0.060		0.116	0.000	0.309	-
Movement and Maneuver	C/FFP	Various : Various	-	0.198		0.186		0.093		0.099		0.192	0.000	0.576	-
Intelligence	C/FFP	Various : Various	-	0.080		0.074		0.129		0.138		0.267	0.000	0.421	-
Fires	C/FFP	Various : Various	-	0.007		0.006		0.002		0.002		0.004	0.000	0.017	-
Sustainment	C/FFP	Various : Various	-	0.093		0.086		0.089		0.095		0.184	0.000	0.363	-
Protection	C/FFP	Various : Various	-	0.186		0.172		0.191		0.206		0.397	0.000	0.755	-
Dismounted Improvised Explosive Device (IED) Defeat	C/FFP	Various : Various	2.889	-		-		-		-		-	Continuing	Continuing	Continuing
Dismounted Operations Support	C/FFP	Various : Various	4.796	-		-		-		-		-	Continuing	Continuing	Continuing
Intelligence, Surveillance, and Reconnaissance (ISR) Shortfalls in Environmentally Inhospitable OEs	C/FFP	Various : Various	5.951	-		-		-		-		-	Continuing	Continuing	Continuing
Small Combat Outpost (COP) / Patrol Base (PB) Force Protection and Sustainment	C/FFP	Various : Various	3.738	-		-		-		-		-	Continuing	Continuing	Continuing
Other-REF RIPL Priorities (5-10)	C/FFP	Various : Various	8.778	-		-		-		-		-	Continuing	Continuing	-
Other	C/FFP	Various : Various	2.208	-		-		-		-		-	0.000	2.208	-
Base: Various Projects-Protect the Force in Counter Insurgency	C/FFP	Various : Various	11.841	-		-		-		-		-	0.000	11.841	-
Small Combat Outpost (COP)/Patrol Base (PB) Sustainment	C/FFP	Various : Various	1.506	-		-		-		-		-	0.000	1.506	-
Base: Various Projects-Enhance Intelligence Surveillance Recon	C/FFP	Various : Various	9.009	-		-		-		-		-	0.000	9.009	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Small Combat Outpost (COP)/Patrol Base (PB) Force Protection	C/FFP	Various : Various	2.093	-		-		-		-		-	0.000	2.093	-
Dismounted Blue Force Tracking and Mission Command	C/FFP	Various : Various	0.528	-		-		-		-		-	0.000	0.528	-
Base: Various Projects-Logistics/Medical in Counterinsurgency Ops	C/FFP	Various : Various	1.639	-		-		-		-		-	0.000	1.639	-
Base: Various Projects-Timeliness of Analysis and Information Dissemination	C/FFP	Various : Various	6.961	-		-		-		-		-	0.000	6.961	-
Congressional Add-Squad Mission Support System (SMSS)	C/FFP	Various : Various	1.600	-		-		-		-		-	0.000	1.600	-
SSTR/Economic Assumptions/FFRDC and SBIR	C/FFP	Various : Various	1.090	-		-		-		-		-	0.000	1.090	-
OCO: Rapid Equipping Force	C/FFP	Various : Various	19.190	-		-		-		-		-	0.000	19.190	-
Subtotal			83.817	0.664		0.617		0.560		0.600		1.160	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
ATEC (REF Integrated Priority List 1-10)	C/FFP	Various : Various	11.344	-		-		-		-		-	Continuing	Continuing	Continuing
ATEC (Warfighter Function Areas)	C/FFP	Various : Various	-	5.975		5.545		2.239		2.400		4.639	0.000	16.159	-
ATEC (REF Integrated Priority List 1-7)	C/FFP	Various : Various	2.000	-		-		-		-		-	0.000	2.000	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) C08 / <i>Rapid Equipping Force</i>
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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Subtotal			13.344	5.975		5.545		2.239		2.400		4.639	Continuing	Continuing	N/A
Project Cost Totals			97.161	6.639		6.162		2.799		3.000		5.799	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) C08 / <i>Rapid Equipping Force</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Rapid Equipping Force																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) C08 / <i>Rapid Equipping Force</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Rapid Equipping Force	1	2017	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>					Project (Number/Name) EL1 / <i>Army Field Feeding Programs</i>		
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
EL1: <i>Army Field Feeding Programs</i>	-	1.873	0.447	1.348	-	1.348	0.498	1.627	2.075	1.482	0.000	9.350
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides for the advanced component development and prototyping of Army combat feeding equipment designed to reduce the logistics burden and Operation and Support (O&S) costs of subsistence support to service personnel. Project supports development of rapidly deployable field food service equipment in coordination with ration development efforts. Project conducts demonstration and validation of improved subsistence support items used to enhance soldier effectiveness and quality of life. This project develops critical enablers that support the Joint Future Force Capabilities and the Joint Expeditionary Mindset by maintaining readiness through fielding and integrating new equipment. This equipment enhances the field Soldier's well-being and provides the Soldier with usable equipment, in addition to reducing sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands on lift, combat zone footprint, and costs for logistical support.

This Project supports Field Feeding programs for the Army.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Battlefield Kitchen (BK) technology development effort	1.873	-	-	-	-
Description: Provide replacement of the obsolete Mobile Kitchen Trailer (MKT) system. The Battlefield Kitchen (BK) shall replace the MKT with a kitchen that provides fuel efficient, thermally controlled, closed combustion appliances within an environmentally controlled workspace. The BK shall provide rations for up to 300 Soldiers within 4 hours of setup. The BK provides refrigeration, running water and a heated serving line using the same off-road prime mover as the MKT as well as transportability by rail, sea, fixed and rotary wing aircraft.					
Title: Ethylene Control Device (ECD) for Multi Temperature Refrigerated Container System (MTRCS)	-	0.200	0.750	-	0.750
Description: Develop a compact, low power, automated system that decomposes ethylene inside the Multi Temperature Refrigerated Container Systems (MTRCS) to extend the shelf life of fresh fruits and vegetables. The 300 watt Ethylene Control Device (ECD) provides an average of two week shelf life extension of fresh produce. It can be operated independently or in unison with the MTRCS refrigeration system and can be temporarily or permanently mounted with no negative impact to the MTRCS storage capacity. (MTRCS Operational Requirements Document (ORD) approved Apr 2002).					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p><i>FY 2018 Plans:</i> Transition mature ethylene control technology from the Navy and Army Science and Technology (S&T) into a functioning prototype that can be evaluated in a realistic field setting. Transition into the MTRCS Program of Record as an Engineering Change to fielded and newly produced MTRCS.</p> <p><i>FY 2019 Base Plans:</i> Will award ECD technology integration contract to MTRCS prime contractor using improvement clause. Complete integrated system design. Conduct evaluations on prototype system integrating into a standard MTRCS. Determine readiness to transition into Engineering and Manufacturing Development (EMD).</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Funds were increased in FY 2019 to fabricate and evaluate ECD prototypes.</p>					
<p><i>Title:</i> Deployable Sustainable Efficient Refrigeration Technology (DESERT)</p> <p><i>Description:</i> Description: Develop enhanced refrigeration unit that uses a lower Global Warming Potential (GWP) refrigerant than the current MTRCS. The Deployable Sustainable Efficient Refrigeration Technology (DESERT) makes use of R-134A as the working fluid. R-134A has a GWP of ~1300 as compared to the current MTRCS refrigerant R404A which has a GWP of ~3900. The redesigned refrigeration unit offers greater fuel efficiency, operation at real sun/desert temperatures of 135F, increased reliability and the ability to make use of alternate power sources to augment efficiency. The DESERT refrigeration unit shall be backwards compatible to the MTRCS for continuing procurement and as a replacement. (MTRCS ORD approved Apr 2002).</p> <p><i>FY 2018 Plans:</i> Transition DESERT technology from the Army Science and Technology Program through a technology transition agreement. Award contract to produce prototypes.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> To be completed in FY18.</p>	-	0.247	-	-	-
<p><i>Title:</i> Food Sanitation Center III (FSC III)</p> <p><i>Description:</i> Develop, Test and Field a Containerized Food Sanitation center using the modular burner and the modular appliance concept that meets the requirements of the Force Provider</p> <p><i>FY 2019 Base Plans:</i></p>	-	-	0.598	-	0.598

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) EL1 / <i>Army Field Feeding Programs</i>

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Will oversee contractor Systems Engineering design approach to develop a comprehensive Food Sanitation Center (FSC) III design that meets the stringent requirements of Force Provider Expeditionary transportation and worldwide fielding paradigms. Conduct preliminary and critical design reviews and oversee the fabrication of high fidelity prototypes.					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> New start in FY 18 that if funding is approved will start conducting in house engineering and then in FY 19 design reviews will start.					
Accomplishments/Planned Programs Subtotals	1.873	0.447	1.348	-	1.348

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• EL2: <i>Army Field Feeding Equipment</i>	1.245	3.002	3.414	-	3.414	4.248	2.921	2.923	2.979	0.000	20.732
• M65806: <i>Assault Kitchen (AK)</i>	5.085	4.608	4.587	-	4.587	2.858	-	-	-	0.000	17.138
• M65801: <i>REFRIGERATED CONTAINER SYSTEMS</i>	10.124	10.877	8.105	1.035	9.140	6.448	7.211	12.607	12.603	0.000	69.010
• R62830: <i>Battlefield Kitchen (BK)</i>	-	-	2.024	-	2.024	6.667	10.705	14.774	18.132	0.000	52.302

Remarks

D. Acquisition Strategy

Project development will transition to Engineering and Manufacturing Development (EMD) and into production after thorough testing.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018				
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>				Project (Number/Name) EL1 / <i>Army Field Feeding Programs</i>								
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
Project Management Support	Various	PMFSS : Natick, MA	0.150	0.199		0.145		0.190		-		0.190	0.000	0.684	-	
Subtotal			0.150	0.199		0.145		0.190		-		0.190	0.000	0.684	N/A	
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
Battlefield Kitchen	Various	PMFSS : Natick, MA	0.958	1.674		-		-		-		-	0.000	2.632	-	
ECD for MTRCS	Various	Various : Various	-	-		0.125		0.657		-		0.657	0.000	0.782	-	
DESERT	Various	PMFSS : Natick, MA	-	-		0.177		-		-		-	0.000	0.177	-	
FSC III	Various	Various : Various	-	-		-		0.501		-		0.501	0.000	0.501	-	
Subtotal			0.958	1.674		0.302		1.158		-		1.158	0.000	4.092	N/A	
Project Cost Totals			1.108	1.873		0.447		1.348		-		1.348	0.000	4.776	N/A	
Remarks																

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) EL1 / <i>Army Field Feeding Programs</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Conduct advanced component development and demonstration of	█				█																							
Award contract for technology integration to MTRCS	█				█				▲ 3																			
Develop testable ECD's prototypes for MTRCS systems	█				█				█																			
Transition ECD to EMD	█				█				▲ 4																			
Award FSC III development contract based on initial designs for FSC III	█				█				▲ 2																			
Design and Fabricate testable FSC III prototype systems	█				█				█																			
Transition FSC III to Development and Demonstration	█				█				▲ 5																			
Transition CO2 technology from S&T/SBIR to MTRCS	█				█				▲ 6																			
Award advanced component development contract for CO2 based refrigeration unit.	█				█				▲ 7																			
Conduct advanced component development and testing to complete CO2 based design	█				█				█				█															
Transition CO2 technology to development and demonstration	█				█				█								▲ 9											
Award component development contract for UGR-A capable AK	█				█				█								▲ 8											
Design and develop UGR-A candidate components for integration	█				█				█								█											

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) EL1 / <i>Army Field Feeding Programs</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Conduct DT required to validate self power, modularity and UGR-A capability																												
Transition UGR-A to development and demonstration																												
Award contract to produce DESERT prototypes																												
Conduct technology viability assessment on Solid Waste Reduction systems																												
Adapt S&T derived or commercial equipment to meet requirements on SWR																												
Conduct developmental testing on prototype of SWR																												
Use test data to develop to develop high fidelity performance spec on SWR																												
Award product development contract on SWR																												
Procure prototype electric/diesel powered TRCS using OTA																												
Develop 2 dual powered TRCS for testing																												
Conduct component testing on modified TRCS																												
Transition TRCS to development and demonstration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) EL1 / <i>Army Field Feeding Programs</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Conduct advanced component development and demonstration for the BK	1	2017	4	2017
Award contract for technology integration to MTRCS	2	2019	2	2019
Develop testable ECD's prototypes for MTRCS systems	1	2018	2	2019
Transition ECD to EMD	4	2019	4	2019
Award FSC III development contract based on initial designs for FSC III	1	2019	1	2019
Design and Fabricate testable FSC III prototype systems	1	2019	4	2019
Transition FSC III to Development and Demonstration	4	2019	4	2019
Transition CO2 technology from S&T/SBIR to MTRCS	1	2020	1	2020
Award advanced component development contract for CO2 based refrigeration unit.	1	2020	1	2020
Conduct advanced component development and testing to complete CO2 based design	2	2020	3	2021
Transition CO2 technology to development and demonstration	4	2021	4	2021
Award component development contract for UGR-A capable AK	1	2021	1	2021
Design and develop UGR-A candidate components for integration	2	2021	4	2021
Conduct DT required to validate self power, modularity and UGR-A capability	4	2021	2	2022
Transition UGR-A to development and demonstration	2	2022	2	2022
Award contract to produce DESERT prototypes	4	2018	4	2018
Conduct technology viability assessment on Solid Waste Reduction systems	1	2022	4	2022
Adapt S&T derived or commercial equipment to meet requirements on SWR	2	2022	3	2022
Conduct developmental testing on prototype of SWR	4	2022	2	2023
Use test data to develop to develop high fidelity performance spec on SWR	3	2023	4	2023
Award product development contract on SWR	4	2023	4	2023
Procure prototype electric/diesel powered TRCS using OTA	1	2022	1	2022

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A / <i>Soldier Support and Survivability</i>	Project (Number/Name) EL1 / <i>Army Field Feeding Programs</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
Develop 2 dual powered TRCS for testing	2	2022	4	2022
Conduct component testing on modified TRCS	1	2023	3	2023
Transition TRCS to development and demonstration	4	2023	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603766A / Tactical Support Development - Adv Dev (MIP)
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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	-	15.730	27.733	35.667	-	35.667	37.731	31.179	34.201	36.169	0.000	218.410
907: Tactical Exploitation Of National Capabilities-MIP	-	15.730	27.733	35.667	-	35.667	37.731	31.179	34.201	36.169	0.000	218.410

Note

All funding is in support of the ACTIVE COMPONENT

A. Mission Description and Budget Item Justification

The Tactical Exploitation of National Capabilities (TENCAP) program serves as the Army's centralized lead to perform National Intelligence cross-agency engineering to evaluate, enhance, prototype, and transition Intelligence, Surveillance, and Reconnaissance (ISR) technologies/capabilities developed by Science and Technology (S&T) and other activities across the National Intelligence Community (IC) into Army systems and architectures. TENCAP (1) ensures continued access to current National and Theater sensors and supporting tactical architectures; and (2) exploits new developments that focus on improving the Analysis and Tasking, Collection, Processing, Exploitation, Dissemination and Feedback (TCPEDF) of intelligence data. This includes efforts to: (1) shorten targeting timelines down to Platoon level; (2) enhance target identification; (3) provide better target location (accuracy); (4) provide continued coverage of a target; and (5) develop in-theater analytic tools to enable data exploitation in near-real-time support to contingency operations.

B. Program Change Summary (\$ in Millions)

	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>
Previous President's Budget	15.730	27.733	32.340	-	32.340
Current President's Budget	15.730	27.733	35.667	-	35.667
Total Adjustments	0.000	0.000	3.327	-	3.327
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	3.327	-	3.327

Change Summary Explanation

Fiscal Year (FY) 2019 adjustment of \$3.327 million is the net result of an increase of \$5.150 million for Army internal adjustments to meet emerging intelligence requirements and a decrease of \$1.823 million for manpower which was transferred to Operations and Maintenance Army (OMA).

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>				Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>			
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
907: <i>Tactical Exploitation Of National Capabilities-MIP</i>	-	15.730	27.733	35.667	-	35.667	37.731	31.179	34.201	36.169	0.000	218.410
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

All funding is in support of the ACTIVE COMPONENT

A. Mission Description and Budget Item Justification

The Tactical Exploitation of National Capabilities (TENCAP) program serves as the Army's centralized lead to perform National Intelligence cross-agency engineering to evaluate, enhance, prototype, and transition Intelligence, Surveillance and Reconnaissance (ISR) technologies/capabilities developed by Science and Technology (S&T) and other activities across the National Intelligence Community (IC) into Army systems and architectures. TENCAP (1) ensures continued access to current National and Theater sensors and supporting tactical architectures; and (2) exploits new developments that focus on improving the Analysis and Tasking, Collection, Processing, Exploitation, Dissemination and Feedback (TCPEDF) of intelligence data. This includes efforts to: (1) shorten targeting timelines down to Platoon level; (2) enhance target identification; (3) provide better target location (accuracy); (4) provide continued coverage of a target; and (5) develop in-theater analytic tools to enable data exploitation in near-real-time support to contingency operations.

FY2019 Base funding in the amount of \$35.667 million provides for: (1) engineering and collaborative development on multiple validated National Intelligence Community (IC) advanced software and prototype developments that leverage National IC invests for Army use and ensure continuous Army interoperability with National IC assets and architectures, e.g. Information Store (iStore), Scalable User-Defined Real-time GEOINT Environment (SURGE), ADV Pilot, GETS-Cedalion Transition, MERIT project management and transition; (2) Advanced Miniaturized Data Acquisition System (AMDAS) 'Next' system development; (3) advanced development of more effective intelligence collection, processing, exploitation and dissemination (PED); and (4) advanced development of capabilities for Air Vigilance (AV) Army Program of Record; and (5) development of TENCAP Radio Frequency Exploitation (TRFE) effort to support future synchronization of SIGINT, Cyber and Electronic Warfare operations.

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

	FY 2017	FY 2018	FY 2019
Title: TENCAP Cross-agency Core Engineering activities	11.109	15.836	10.594
Description: By utilizing organic and matrix engineering subject matter experts, TENCAP collaborates, develops and exploits emerging multi-intelligence based technologies to satisfy/accelerate Army Intelligence, Surveillance, Reconnaissance (ISR), Mission Command and Force Protection requirements.			
FY 2018 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>	Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Incorporate Army requirements into earliest stages of National developments; Ensure Army access to sensors and Space-based capabilities; Monitor emerging technologies and systems; Exploit advances in commercial imagery and signal technologies; Develop prototypes that improve Army intelligence products.</p> <p>FY 2019 Plans: Continued work to incorporate Army requirements into earliest stages of National developments; Ensure Army access to sensors and multi-intelligence based capabilities; Monitor emerging technologies and systems; Exploit advances in commercial imagery and signal technologies; Develop prototypes that improve Army intelligence products.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funds align to TENCAP engineering and management efforts that includes initial studies and designs, and progresses to prototype development and testing.</p>				
<p>Title: Air Vigilance - Advanced Development</p> <p>Description: Enhance intelligence, force protection, and indications and warning capabilities under Army TENCAP program.</p> <p>FY 2018 Plans: Advance signal development and software enhancements for Air Vigilance (AV) Army Program of Record, and other similar follow-on prototype systems.</p> <p>FY 2019 Plans: Continue to develop advanced signal and software enhancements for Air Vigilance (AV) Army Program of Record.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funds align to software changes required by Capability Drop requirements and newly identified and/or evolving threats.</p>		0.530	5.802	5.163
<p>Title: Advanced Miniaturized Data Acquisition System(AMDAS)/ AMDAS Dissemination Vehicle (ADV)</p> <p>Description: Continue advanced engineering and development efforts to ensure continued interoperability and effectiveness of Army Corp-level TENCAP subsystems that provide national data to the tactical warfighter via intelligence community partners classified national systems.</p> <p>FY 2018 Plans: AMDAS Next: Design prototype for TENCAP new subsystem antenna and advance sensor development, and design ground processor, to ensure alignment with evolving national architectural enhancements as the National Technical Means (NTM) capabilities progress.</p> <p>FY 2019 Plans:</p>		4.091	6.095	14.760

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>	Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>AMDAS Next: Development of TENCAP new prototype subsystem antenna, which will include modeling and simulation along with early developmental testing. Continued work on advance sensor development, and design ground processor, to ensure alignment with evolving national architectural enhancements as the National Technical Means (NTM) capabilities progress.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funds align with progression of engineering efforts from requirement refinement, studies and initial design development, into system sub-element prototype development and initial developmental testing.</p>			
<p>Title: TENCAP Radio Frequency Exploitation (TRFE)</p> <p>Description: New prototype capability kit that targets modern digital communications systems employed by near-peer nation states armies and assist with Battlespace RF Characterization for modern communication environments with the intent to synchronize SIGINT, Cyber and Electronic Warfare operations. Utilizes commercial industry components and architectures to minimize hardware costs, risk and maximizes scalability/modularity.</p> <p>FY 2019 Plans: Initial Development of TRFE cognitive software based Electronic Warfare and Cyber Attack prototype capability focused on countering Peer State and modern communication targets and threats.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funds aligned to initiate TENCAP Radio Frequency Exploitation (TRFE) advanced development and prototyping efforts.</p>	-	-	5.150
Accomplishments/Planned Programs Subtotals	15.730	27.733	35.667

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0605766A: <i>National Capabilities Integration (MIP)</i>	4.955	6.882	12.340	-	12.340	11.435	9.177	13.182	12.554	0.000	70.525
• 122011 OMA: <i>Contractor Logistics Support and Other Weapon Support, OMA 122011</i>	-	2.029	2.070	-	2.070	2.111	2.153	2.196	2.240	Continuing	Continuing

Remarks

D. Acquisition Strategy
The Army Tactical Exploitation of National Capabilities (TENCAP) mission is a Congressionally mandated and chartered enduring requirement to leverage National intelligence capabilities useful to the tactical Army. The Army TENCAP acquisition strategy is driven by an annual TENCAP General Officer Steering Group (TGOSG),

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>	Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>
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co-chaired by the Army G2; Army G8; and the Military Deputy to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology [ASA(ALT)]; and includes representatives from the Army G3; Army G6; Army Training and Doctrine Command (TRADOC); and the Program Executive Office for Intelligence, Electronic Warfare and Sensors (PEO IEW&S). The TGOSG reviews, validates, prioritizes, and guides Army TENCAP efforts, according to Army and Defense strategy. Based on this TGOSG guidance, Army TENCAP invests BA 6.4 RDTE in Intelligence Community (IC) developments during the more cost-effective advanced development phase to ensure Army requirements are met with minimal redundancy to Army investments. Army TENCAP then uses BA 6.5 RDTE to manage the transition of these advanced development efforts through system development and integration into Army Programs of Record (POR). This strategy ensures these leveraged investments remain viable through multiple budget cycles, significantly increasing successful transition to recipient Army POR. With acquisition discipline and oversight provided by PEO IEW&S, Army TENCAP executes the TGOSG approved efforts through use of multiple contracts and agreements with the military, National agencies, Labs, Industry Partners and Academia for the full duration required to complete development and transition these National capabilities into enduring Army programs.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603766A / Tactical Support Development - Adv Dev (MIP)				907 / Tactical Exploitation Of National Capabilities-MIP							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Intelligence Engineers (SETA)	C/FFPLOE	TASC, Inc : Alexandria, VA	14.416	4.115	Feb 2017	4.200	Feb 2018	3.033	Jan 2019	-		3.033	0.000	25.764	Continuing
Intelligence Engineers(Matrix Gov)	MIPR	AGC : Alexandria, VA	4.803	1.174	Jan 2017	1.280	Jan 2018	1.300	Jan 2019	-		1.300	0.000	8.557	Continuing
Subtotal			19.219	5.289		5.480		4.333		-		4.333	0.000	34.321	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
TENCAP Core (Focus) Areas	Various	Multiple : Multiple	7.309	3.782	Jan 2017	7.400	Jan 2018	3.103	Feb 2019	-		3.103	0.000	21.594	Continuing
Air Vigilance	MIPR	Classified : MIPR	3.243	0.530	Jan 2017	5.802	Jan 2018	5.163	Jan 2019	-		5.163	0.000	14.738	Continuing
AMDAS/ADV	MIPR	Classified : MIPR	7.504	4.091	Jan 2017	6.095	Jan 2018	14.760	Jan 2019	-		14.760	0.000	32.450	Continuing
TRFE	MIPR	Classified : MIPR	-	-		-		5.150	Jan 2019	-		5.150	0.000	5.150	Continuing
Subtotal			18.056	8.403		19.297		28.176		-		28.176	0.000	73.932	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Prgm Mgmt-Dir Gov,travel,etc.	Allot	Army TENCAP : Alexandria, VA	10.505	1.150	Jan 2017	2.076	Jan 2018	2.258	Jan 2019	-		2.258	0.000	15.989	Continuing
Secured Facilities	MIPR	Army Geospatial : Ft. Belvoir, VA	2.224	0.423	Jan 2017	0.455	Jan 2018	0.475	Jan 2019	-		0.475	0.000	3.577	Continuing
Subtotal			12.729	1.573		2.531		2.733		-		2.733	0.000	19.566	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018				
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>					Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>						
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Lab Tests, Exercises, Simulations	MIPR	Multiple : Multiple	0.920	0.465	Jan 2017	0.425	Jan 2018	0.425	Jan 2019	-		0.425	0.000	2.235	Continuing
Subtotal			0.920	0.465		0.425		0.425		-		0.425	0.000	2.235	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			50.924	15.730		27.733		35.667		-		35.667	0.000	130.054	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>	Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
CORE Cross-Agency Advanced Development and Engineering																												
Development with Nat Intel Community																												
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY19-23 POM	▲ 1																											
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY20-24 POM					▲ 2																							
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY21-25 POM									▲ 3																			
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-26 POM													▲ 4															
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-27 POM																	▲ 5											
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24-28 POM																					▲ 6							
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25-29 POM																									▲ 7			
ADV Advanced Development and Engineering																												
AMDAS Next Studies																												
AMDAS Next Antenna Design/Development																												
AMDAS Next Ground Processor Development																												
Air Vigilance Advanced Development and System prototype eff																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>		Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
TRFE Prototype Development and System Integration Efforts																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A / <i>Tactical Support Development - Adv Dev (MIP)</i>	Project (Number/Name) 907 / <i>Tactical Exploitation Of National Capabilities-MIP</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
CORE Cross-Agency Advanced Development and Engineering	4	2006	1	2023
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY19-23 POM	2	2017	2	2017
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY20-24 POM	2	2018	2	2018
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY21-25 POM	2	2019	2	2019
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-26 POM	2	2020	2	2020
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-27 POM	2	2021	2	2021
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24-28 POM	2	2022	2	2022
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25-29 POM	2	2023	2	2023
ADV Advanced Development and Engineering	2	2015	1	2023
AMDAS Next Studies	2	2015	1	2019
AMDAS Next Antenna Design/Development	2	2017	1	2020
AMDAS Next Ground Processor Development	2	2018	1	2021
Air Vigilance Advanced Development and System prototype efforts	3	2013	2	2022
TRFE Prototype Development and System Integration Efforts	4	2018	1	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603774A / Night Vision System Advanced Development
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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	-	9.930	12.347	7.350	-	7.350	8.012	9.341	9.951	7.153	Continuing	Continuing
VT7: Soldier Maneuver Sensors - Adv Dev	-	9.930	12.347	7.350	-	7.350	6.529	6.574	7.184	7.153	Continuing	Continuing
VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV*	-	0.000	0.000	0.000	-	0.000	1.483	2.767	2.767	0.000	Continuing	Continuing

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2019

A. Mission Description and Budget Item Justification

This program element focuses on efforts to evaluate and integrate technologies and representative prototype systems that facilitate the development of Soldier-borne sensor devices transitioning from the laboratory to operational use. Efforts focus on proving out commonality across as broad a spectrum of users as possible to provide enhanced Soldier products, giving them superiority on the battlefield.

Project VT7 (Soldier Maneuver Sensors-Advanced Development): This budget item focuses on developing integrated and enhanced products to provide the Soldier with the ability to "fight, win and survive, day and night, in a multi-domain environment now and tomorrow". Products include maneuver capabilities to see, detect, and identify and target acquisition capabilities to identify and mitigate threat forces prior to being engaged. The integration of higher performing multispectral sensors with smart processing will provide automatically adjusted weapon sight reticles and leverage network connectivity to enable improved situational awareness/understanding. Additional capabilities include signature management and resiliency across the electromagnetic spectrum, integration of a modular design structure for laser target acquisition applications, next generation vision system, and mitigation of manned and unmanned threat sensor systems. This project supports efforts to evaluate and integrate technologies and representative prototype systems for development of Soldier-borne sensor devices, transitioning from the Science and Technology (S&T) stage to operational use. This project includes associated costs for efforts associated with integration and interface of products on the Soldiers' head, body, and weapon.

Project VT8 (Soldier Precision Targeting Devices - Advanced Development): These efforts focus on Technology Maturation Risk Reduction and on the technology demonstration of component technologies used in Soldier portable precision targeting devices to continue improvements to system performance while reducing size, weight, and power required by those systems. Efforts will improve the Soldier's ability to precisely locate and designate targets across a broader range of operating environments, including all weather conditions. The technologies developed will support the Joint Effects Targeting System (JETS) Target Locator/Designator System (TLDS) and the Lightweight Laser Designator Rangefinder (LLDR). Component technology development will precede integration into specific systems and will include improved Precision Azimuth and Vertical Angle Measurement (PAVAM) devices; solid-state, dual-color lasers for range finding/designation/markings; and electro-optical sensors such as infrared, near-infrared, ultra-violet, and visible spectrum imagers, laser designator spot detection and imaging, and integration of advanced power management technologies.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603774A / <i>Night Vision System Advanced Development</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	10.321	12.347	8.435	-	8.435
Current President's Budget	9.930	12.347	7.350	-	7.350
Total Adjustments	-0.391	0.000	-1.085	-	-1.085
• Congressional General Reductions	-0.005	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.386	-			
• Adjustments to Budget Years	-	-	-1.085	-	-1.085

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603774A / <i>Night Vision System Advanced Development</i>					Project (Number/Name) VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>		
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
VT7: <i>Soldier Maneuver Sensors - Adv Dev</i>	-	9.930	12.347	7.350	-	7.350	6.529	6.574	7.184	7.153	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This budget item focuses on developing integrated and enhanced products to provide the Soldier with the ability to "fight, win and survive, day and night, in a multi-domain environment now and tomorrow". Products include maneuver capabilities to see, detect, and identify and target acquisition capabilities to identify and mitigate threat forces prior to being engaged. The integration of higher performing multispectral sensors with smart processing will provide automatically adjusted weapon sight reticles and leverage network connectivity to enable improved situational awareness/understanding. Additional capabilities include signature management and resiliency across the electromagnetic spectrum, integration of a modular design structure for laser target acquisition applications, next generation vision system, and mitigation of manned and unmanned threat sensor systems. This project supports efforts to evaluate and integrate technologies and representative prototype systems for development of Soldier-borne sensor devices, transitioning from the Science and Technology (S&T) stage to operational use. This project includes associated costs for efforts associated with integration and interface of products on the Soldiers' head, body, and weapon.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Family of Vision and Mobility Capabilities (FVMC)	7.845	10.374	5.815	-	5.815
Description: FVMC is the next generation vision system that provides enhanced capabilities for day and night that will reduce Soldier's load and allow hands free operation. The FVMC will provide spatially-aligned imagery from the weapon sight to the heads-up display. FVMC supports Nett Warrior by fusing sensor video and data sources using smart processing to provide improved situational awareness/understanding in the Soldier vision system. The FVMC will provide day/night Rapid Target Acquisition capability by wirelessly interfacing with the Family of Weapon Sights-Individual variant. The FVMC will serve as the Soldier's digital platform for displaying augmented reality data. FVMC will integrate with future digital combat optics. FVMC provides capabilities that support overmatch against threats documented in the New Generation Warfare study, OSD Close Combat Strategic Portfolio Review and the Small Arms Ammunition Configuration study. These capabilities are captured in the Maneuver Force Modernization Strategy and Squad and Soldier Modernization Deep Dive strategic plans.					
FY 2018 Plans: Continue development of components algorithms and demonstrators in support of providing FVMC.					
FY 2019 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603774A / <i>Night Vision System Advanced Development</i>	Project (Number/Name) VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Continue development of components algorithms and demonstrators in support of providing FVMC. FY 2018 to FY 2019 Increase/Decrease Statement: This decrease is due to completion of 6.4 Budget Activity tasks and expected 6.5 Budget Activity funding to mature technologies for subsequent production.					
Title: Pre-Shot Threat Detection (PTD) Description: The PTD is a capability designed to detect threat Snipers, Forward Observers and Scouts equipped with direct view and indirect view optics. The PTD functions include laser illumination, optical augmentation and pointing. PTD functions will be integrated into other Soldier systems. The PTD capabilities will be developed in two parallel paths to allow for technology insertions when available. PTD (Overt) provides the maneuver element with an initial solution (Overt) that provides the Soldier with a capability to conduct pre-shot threat detection by detecting and identifying the location. PTD combines the capability of the currently fielded laser systems, thereby reducing redundancy and the Soldiers' load. PTD (Covert) provides the maneuver element with an enhanced solution (Covert) that provides the Soldier with a capability to conduct pre-shot threat detection by detecting and identifying the location of threat optics while remaining undetected. FY 2018 Plans: Continue development of covert components functionality. FY 2019 Base Plans: Continue development of covert components functionality. FY 2018 to FY 2019 Increase/Decrease Statement: This decrease is due to completion of 6.4 Budget Activity tasks and expected 6.5 Budget Activity funding to mature technologies for subsequent production.	2.085	1.973	0.515	-	0.515
Title: Family of Target Acquisition Laser (FTAL) Description: FTAL develops modular laser components and systems to support target acquisition for pointing, ranging, target hand-off, detection and mitigation of threat sensors. FTAL will develop a common laser range finding core for fire control and other laser capabilities based on Squad member Table of Organization and Equipment (TOE) position. FTAL will also mitigate threat from Unmanned Aerial Systems (UAS) and will pursue a common remote to operate all weapon enablers. FY 2019 Base Plans:	-	-	1.020	-	1.020

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603774A / <i>Night Vision System Advanced Development</i>	Project (Number/Name) VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Initiate development and integration of modular target acquisition laser components.					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> This increase is due to maturing research and development laser technology that can now enter a 6.4 Budget Activity level effort to further mature the prototypes in preparation for subsequent pre production activities.					
Accomplishments/Planned Programs Subtotals	9.930	12.347	7.350	-	7.350

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
• L67: <i>Night Vision Systems -Eng Dev (PE 604710 L67)</i>	23.054	32.504	60.060	-	60.060	29.079	20.416	18.259	18.164	Continuing	Continuing
• K36400: <i>Helmet Mounted Enhanced Vision Devices (HMEVD) (SSN K36400)</i>	118.187	144.644	109.724	0.027	109.751	105.661	58.047	61.783	116.345	Continuing	Continuing
• K22002: <i>Family of Weapon Sights - Individual (FWS-I) (SSN K22002)</i>	49.536	49.887	94.932	-	94.932	81.544	79.213	19.124	22.473	Continuing	Continuing
• K22003: <i>Family of Weapon Sights - Crew Served (FWS-CS) (SSN K22003)</i>	-	1.033	30.581	0.525	31.106	77.345	84.818	93.886	75.758	Continuing	Continuing
• K22004: <i>Family of Weapon Sights - Sniper (FWS-S) (SSN K22004)</i>	-	8.185	15.224	-	15.224	25.800	16.001	1.350	1.364	Continuing	Continuing
• B53800: <i>Laser Targeting Locator Modules (LTLM) (SSN B53800)</i>	33.983	22.226	34.960	0.436	35.396	20.138	26.231	21.136	24.072	Continuing	Continuing
• K35110: <i>Small Tactical Optical Rifle Mounted MLRF (STORM) (SSN K35110)</i>	18.843	14.007	22.882	0.060	22.942	22.906	23.218	26.825	26.389	Continuing	Continuing

Remarks

D. Acquisition Strategy
The various developmental programs in this project continue to exercise competitively awarded contracts using best value source selection procedures.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603774A / <i>Night Vision System Advanced Development</i>	Project (Number/Name) VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603774A / Night Vision System Advanced Development				VT7 / Soldier Maneuver Sensors - Adv Dev							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management	MIPR	Various : Various	4.065	1.018	Feb 2017	0.565		0.075	Feb 2019	-		0.075	Continuing	Continuing	-
Subtotal			4.065	1.018		0.565		0.075		-		0.075	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Family of Vision and Mobility Capabilities (FVMC)	MIPR	NVESD : FT BELVOIR, VA	-	6.511	Aug 2017	9.309		5.815	Dec 2018	-		5.815	Continuing	Continuing	-
Pre-Shot Threat Detection (PTD)	MIPR	NVESD : FT BELVOIR, VA	5.458	2.085	Jan 2017	1.973		0.415	Dec 2018	-		0.415	Continuing	Continuing	-
Family of Target Acquisition Laser (FTAL)	MIPR	NVESD : FT BELVOIR, VA	-	-		-		0.620	Dec 2018	-		0.620	Continuing	Continuing	-
Subtotal			5.458	8.596		11.282		6.850		-		6.850	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Matrix Support	MIPR	NVESD : FT BELVOIR, VA	1.571	0.316	Aug 2017	0.500		0.175	Dec 2018	-		0.175	Continuing	Continuing	-
Subtotal			1.571	0.316		0.500		0.175		-		0.175	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Government Support Test Activity	MIPR	Army Test and Evaluation Command : Varrious	0.600	-		-		0.250	Apr 2019	-		0.250	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603774A / <i>Night Vision System Advanced Development</i>		Project (Number/Name) VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Family of Vision and Mobility Capabilities (FVMC)	Development																											
Overt PTD TMRR	TMRR																											
Overt PTD Test and Evaluation (T&E)			T&E																									
Leader Smart Sight (S&T)												Development																
Covert PTD Development					Development																							
FAMILY OF TARGET ACQUISITION LASER (FTAL)									Development																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603774A / <i>Night Vision System Advanced Development</i>	Project (Number/Name) VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FAMILY OF WEAPON SIGHTS (FWS)	4	2011	4	2011
FWS-I Technology Maturation Risk Reduction (TMRR)	4	2011	3	2014
FWS-CS/S Technology Maturation Risk Reduction (TMRR)	4	2011	3	2016
Family of Vision and Mobility Capabilities (FVMC)	3	2013	4	2020
PRE-SHOT THREAT DETECTION (PTD)	4	2013	4	2013
Overt PTD TMRR	3	2016	1	2017
Overt PTD Test and Evaluation (T&E)	4	2017	1	2018
Leader Smart Sight (S&T)	1	2020	4	2023
Covert PTD Development	1	2018	4	2018
FAMILY OF TARGET ACQUISITION LASER (FTAL)	1	2019	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603779A / Environmental Quality Technology Dem/Val
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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	-	7.480	10.456	14.749	-	14.749	14.979	16.133	15.182	14.843	0.000	93.822
035: National Defense Cntr For Enviro Excellence	-	2.446	3.779	4.870	-	4.870	4.968	5.075	5.185	5.300	0.000	31.623
E21: Environmental Quality Technology Dem/Val	-	5.034	6.677	9.879	-	9.879	10.011	11.058	9.997	9.543	0.000	62.199

A. Mission Description and Budget Item Justification

There is a broad application potential for environmental quality technology (EQT) to be applied to multiple Army weapon systems and installations. However, technology must be demonstrated and validated (total ownership cost and performance data identified) before potential users will consider exploiting it. This Program Element (PE) includes Projects focused on validating the general military utility or cost reduction potential of technology when applied to different types of infrastructure, military equipment or techniques. It may include validations and proof-of-principle demonstrations in field exercises to evaluate upgrades or provide new operational capabilities. The validation of technologies will be in as realistic an operating environment as possible to assess performance or cost reduction potential. EQT demonstration/validation is systemic, i.e. applies to a class of systems (e.g., vehicles or aircraft) or to a Department of Army-wide, multiple site/installation problem (e.g. unexploded ordnance detection and discrimination). This PE will address, and eventually resource, programs in each of the Army environmental quality technology pillars (military materials in the environment, sustainable ranges and lands, compliance, and pollution prevention). All work must be endorsed by potential users and supported by a state-of-the-art assessment (i.e. "technology is heading for user to implement").

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	7.785	10.456	11.727	-	11.727
Current President's Budget	7.480	10.456	14.749	-	14.749
Total Adjustments	-0.305	0.000	3.022	-	3.022
• Congressional General Reductions	-0.004	-	-	-	-
• Congressional Directed Reductions	-	-	-	-	-
• Congressional Rescissions	-	-	-	-	-
• Congressional Adds	-	-	-	-	-
• Congressional Directed Transfers	-	-	-	-	-
• Reprogrammings	-0.004	-	-	-	-
• SBIR/STTR Transfer	-0.297	-	-	-	-
• Adjustments to Budget Years	-	-	3.022	-	3.022

Change Summary Explanation

Fiscal Year 2019 increases support of National Defense Center for Environmental Excellence and Pollution Prevention Technology Dem/Val efforts.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>				Project (Number/Name) 035 / <i>National Defense Cntr For Enviro Excellence</i>			
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
035: <i>National Defense Cntr For Enviro Excellence</i>	-	2.446	3.779	4.870	-	4.870	4.968	5.075	5.185	5.300	0.000	31.623
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The National Defense Center for Environmental Excellence (NDCEE) was established by Congress in 1990 with a directive to "serve as a national leadership organization to address high priority environmental problems for the Department of Defense (DoD), other government organizations, and the industrial community." The NDCEE Program is a national resource for developing and disseminating advanced environmental technologies. The NDCEE is used to: demonstrate environmentally acceptable technology to industry; validate new technology prior to transferring that technology; and assist in the training of potential users as part of that technology transfer process. The NDCEE is a DoD resource for environmental quality management and technology validation. This Project is managed by the Army on behalf of the Office of the Assistant Deputy Under Secretary of Defense for Installations & Environment. In May 2008, the Project name was re-designated from the National Defense Center for Environmental Excellence to the National Defense Center for Energy and Environment to ensure that the Center's mission recognizes and addresses the strategic interdependence of energy and environmental technology requirements within an overall sustainability framework in support of our installations, weapons systems and war fighters. This name change also directly supports the DoD's proactive implementation of Executive Order 13423, "Strengthening Federal Environmental, Energy and Transportation Management."

The United States (U.S.) Army's broadly encompassing and growing mobile, personal and stationary advanced energy technology requirements include infrastructure, alternative and synthetic fuels, surety, renewables, storage, distribution, advanced power, micro-grids, transportation, systems integration and others. Further, to train as we fight, validated energy and environmental technologies need to be available and implemented at Army installations. The NDCEE will continue to demonstrate, validate, and transfer these technologies supporting our integrated environment, safety, occupational health and energy objectives with full consideration of the triple bottom line of mission, environment and community.

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

	FY 2017	FY 2018	FY 2019
Title: Conduct demonstration/validation of environmentally acceptable technologies that enhance military readiness and reduce production, operating, and/or disposal costs.	2.276	2.935	4.770
Description: Supports the demonstration and validation of environmental, safety, occupational health, and energy technologies that support the Army's Environmental Quality Technology mission. The objective is to determine if the technology is ready for implementation that will enhance military readiness and reduce production, operating, and/or disposal costs.			
FY 2018 Plans: Conduct demonstration/validation of environmental safety and occupational health (ESOH) and Energy technologies that enhance military readiness and reduce production, operating, and/or disposal costs. Conduct project selection process for potential Fiscal			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) 035 / <i>National Defense Cntr For Enviro Excellence</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Year (FY) 19 new starts. Technologies will be selected by the NDCEE Technical Working Group and approved by the NDCEE Executive Advisory Board.</p> <p>FY 2019 Plans: Will conduct demonstration/validation of ESOH and Energy technologies that enhance military readiness and reduce production, operating, and/or disposal costs. Will conduct project selection process for potential FY 2020 new starts. Technologies will be selected by the NDCEE Technical Working Group and approved by the NDCEE Executive Advisory Board.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding is based upon an established mechanism for project demonstrations and validations that support priority requirements, and a historical growth trend of mission essential requirements across the Services. Total program costs include program operating and management expenses, and technology demonstration / validation of priority projects. Projects are typically two years in duration and funding is planned for year two of viable current year projects. There are 13 active projects (started in FY16 and 17). Eight new start projects are anticipated for FY18 (final decision to be made in Dec 2017), out of 24 joint service prioritized and approved demonstration/validation projects. The maximum number of projects will be funded, based on the budget received. It is anticipated 16 high-priority joint service demonstration/validation projects will remain unfunded. Increase in FY19 funding recognizes that high-priority demonstration/validation projects remain unfunded and additional dollars will be used to fund the remaining, outstanding FY18 projects.</p>				
<p>Title: NDCEE Government program management during contract negotiations and during project formulation, execution, and technology transfer.</p> <p>Description: Funds the government program management office for the NDCEE. This consists of personnel assisting in contract negotiations and during project formulation, execution, and technology transfer.</p> <p>FY 2018 Plans: Fund NDCEE Government program management during contract negotiations and project formulation, execution, and technology transfer.</p> <p>FY 2019 Plans: Will fund NDCEE Government program management during contract negotiations and project formulation, execution, and technology transfer.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decrease in program management is a result of moving day-to-day operations of NDCEE from RDECOM to AEC. Program management transition occurred at the beginning of FY18.</p>		0.170	0.844	0.100
Accomplishments/Planned Programs Subtotals		2.446	3.779	4.870

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) 035 / <i>National Defense Cntr For Enviro Excellence</i>

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

N/A

Remarks

D. Acquisition Strategy

The NDCEE is a national asset focused on DoD applications that include technology transfer to appropriate DoD organizations. The NDCEE fosters an outreach program to describe its products and capabilities that include publication of results and participation in professional meetings, symposia, conferences, and appropriate coordination with industry. The management strategy for the NDCEE centers on a DoD Executive Advisory Board (EAB) chaired by the DoD NDCEE Executive Agent on behalf of the Deputy Undersecretary of Defense for Installations and Environment and composed of senior DoD leadership to oversee NDCEE operations. The EAB is supported by the NDCEE Technical Working Group (TWG) that includes senior level staff members from each of the offices represented on the EAB. The NDCEE TWG coordinates all NDCEE activities, votes on proposed joint NDCEE projects, and reports back to the EAB Principals. Working at the tactical levels, three Focus Groups (environment, safety/occupational health, and energy) were established to develop joint projects. The Army's Environmental Quality Technology Program participating in the Focus Groups also assists in the formulation of suggested environmental technology projects to be demonstrated within the NDCEE Program. The contracting strategy of the NDCEE is based on using an NDCEE Contracting Officer's Representative to validate all the contractual portions of the NDCEE and by technical monitors (TM) to oversee the technical aspects of each contracted task. A prime contractor operates NDCEE test facility to validate environmentally compatible technologies on a representative "shop floor". The NDCEE accounts for and conducts work for: (1) direct funded Army tasks; (2) reimbursable tasks from within DoD and from other Government agencies; and (3) when applicable Congressionally directed and funded tasks.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) 035 / <i>National Defense Cntr For Enviro Excellence</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Program Management Support	MIPR	AEC : San Antonio, TX	24.706	0.170	Jan 2017	0.844		0.100	Nov 2018	-		0.100	Continuing	Continuing	Continuing
Subtotal			24.706	0.170		0.844		0.100		-		0.100	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Product Development	TBD	Various : Various	8.797	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			8.797	-		-		-		-		-	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Technical Data	Various	Various : Various	24.030	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			24.030	-		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Development Testing and Evaluation	Various	Various. : Various	29.760	2.276	Mar 2017	2.935		4.770	Nov 2018	-		4.770	Continuing	Continuing	Continuing
Subtotal			29.760	2.276		2.935		4.770		-		4.770	Continuing	Continuing	N/A

Remarks
Increase in FY19 funding reflects new requirements for additional technology demonstration/validation projects. Current funding level is below requirement level.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018			
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603779A / Environmental Quality Technology Dem/Val				Project (Number/Name) 035 / National Defense Cntr For Enviro Excellence				
	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	87.293	2.446	3.779		4.870	-	4.870	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>		Project (Number/Name) 035 / <i>National Defense Cntr For Enviro Excellence</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
NDCEE Management and Operations (Enduring)	[Redacted]																											
NDCEE Env, Safety, Occ Health, and Energy Technology Dem/Val	[Redacted]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) 035 / <i>National Defense Cntr For Enviro Excellence</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NDCEE Management and Operations (Enduring)	1	2014	4	2023
NDCEE Env, Safety, Occ Health, and Energy Technology Dem/Val (Enduring)	1	2014	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>				Project (Number/Name) E21 / <i>Environmental Quality Technology Dem/Val</i>			
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
E21: <i>Environmental Quality Technology Dem/Val</i>	-	5.034	6.677	9.879	-	9.879	10.011	11.058	9.997	9.543	0.000	62.199
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project supports Advanced Component Development and Prototypes of environmental quality technologies developed within the Army Environmental Quality Technology program. The Project increases operational sustainment and warfighter training capabilities by reducing soldier and worker health risks and environmental quality impacts that would otherwise result in restoration needs and compliance enforcement actions against installations while simultaneously increasing performance and standardization across the Army. The Project expedites technology transition from the laboratory to operational use by demonstrating new materials and processes to fulfill the performance requirements outlined in Material Specifications, Depot Maintenance Work Requirements, Technical Manuals, Drawings and other technical data. Materials and processes demonstrated under this project are inherently more sustainable than the baseline with respect to environmental, safety and occupational health concerns, thereby reducing life cycle costs incurred by acquisition, industrial base and installation end users.

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

	FY 2017	FY 2018	FY 2019
Title: Environmental quality technology demonstration and validation: Toxic Metal Reduction in Surface Finishing of Army Weapon Systems	2.105	2.628	2.081
Description: Increase readiness and environmental sustainability of Army depots and maintenance facilities by reducing or eliminating the use of hexavalent chromium, cadmium and associated toxic or carcinogenic materials used in surface finishing processes.			
FY 2018 Plans: Establish hexavalent chromium-free pilot processes for depositing and repairing hard chrome surfaces; validate alternative products for sealing black oxide, hard anodize and zinc plated surfaces at Army depots.			
FY 2019 Plans: Will demonstrate hexavalent chromium-free anodizing process on aluminum aircraft parts; establish test bed for cold spray repair of hard chrome-plated wear surfaces during depot maintenance; qualify hexavalent chromium-free alternatives for sealing heavy zinc phosphate surfaces on steel weapon systems.			
FY 2018 to FY 2019 Increase/Decrease Statement: FY18 funds higher than FY19 due to the purchase and installation of pilot process equipment.			
Title: Environmental quality technology demonstration and validation: Airborne Lead Reduction from Army Weapon Systems	1.500	1.277	3.105

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) E21 / <i>Environmental Quality Technology Dem/Val</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Description: Sustain soldier training readiness and ensure compliance at Army installations by reducing or eliminating the use of lead compounds in rocket and missile propellants and primary explosives (primers/detonators/initiators).</p> <p>FY 2018 Plans: Load lead-free primers into relevant end items using new pilot-scale automated process and conduct initial performance testing; Conduct flight-weight motor testing for rocket systems utilizing reduced-lead extruded rocket propellants.</p> <p>FY 2019 Plans: Will demonstrate lead-free primary explosive composition in stab detonator and electric detonator configurations; establish pilot-scale production of lead-free percussion primers and conduct first article testing in hand held signals.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY19 funding increase supports demonstration/validation of lead-free alternatives in multiple items.</p>				
<p>Title: Environmental quality technology demonstration and validation: ESOH Impacts of Short-Term Noise Assessment Procedures</p> <p>Description: Demonstrate and validate the technologies, including the underlying computational algorithms, for the impact of short-term noise assessment procedures on environmental footprint and Soldier readiness. When completed the program will: 1) have validated short-term noise assessment procedures, including uncertainty metrics and 2) have on-line, self-guided training modules for Sustainable Range Program range officers on performing and interpreting short-term noise assessment results.</p> <p>FY 2018 Plans: Complete analysis of all datasets including any updates indicated by the demonstration / validation results. Test model updates to ensure continued accuracy and document the updates / validation results. Initiate developments of training modules for range managers.</p> <p>FY 2019 Plans: Will provide a report that summarizes all results of the demonstration and validation study. Validation report will document assessment accuracy across a range of environmental conditions and assessment consistency across user applications.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY19 funding decreased to the level required to provide the report of the demonstration and validation study.</p>		0.586	0.625	0.250
<p>Title: Environmental quality technology demonstration and validation: Advanced Water Reuse Technology for Fixed Installations</p> <p>Description: Demonstrate and validate advanced water reuse technology for fixed installations and assess ESOH impacts. At the completion of this program, the following will be accomplished: 1) demonstration of energy efficient advanced water reuse</p>		0.843	0.572	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) E21 / <i>Environmental Quality Technology Dem/Val</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>technology at installations, 2) ESOH analysis of three water reuse technologies for installations including shower water recycling, distributed water reclamation, and centralized reclamation; 3) reports on best practices for permitting, design, and safe operation of advanced reuse technologies; and 4) marketing materials comparing quality of advanced reuse water to tap and bottled water to support technology adoption campaigns at installations and contingency bases.</p> <p>FY 2018 Plans: Execute demonstration testing at Tobyhanna Weapons Depot, Fort Riley and Fort Carson. Demonstrations will include measurements of technology performance with a focus on removal of emerging micro-pollutants to guide ESOH analysis in coordination with Army Public Health Center (APHC).</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Effort completed in FY18.</p>				
<p>Title: Environmental quality technology demonstration and validation: Insensitive Munitions (IM) Wastewater Treatment</p> <p>Description: Demonstrate and validate optimized scalable wastewater treatment system basic technology for the destructive treatment of existing and emerging insensitive munitions (IM) contaminated production wastewater generated during Army ammunition plant munitions production.</p> <p>FY 2018 Plans: Demonstrate new IMX production process wastewater remediation technology to allow efficient, low cost destruction of harmful and regulated contaminants for increased surface water discharge. Technology will allow increased production rates of munitions compounds while meeting permit regulatory thresholds for wastewater discharge.</p> <p>FY 2019 Plans: Will transition IM wastewater treatment technologies from a prototype pilot scale system to an initial field-scale pilot system for demonstration and validation of cost effective treatment of IM wastewater.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY19 increase funds the transition to an initial field-scale pilot system for demonstration and validation.</p>		-	1.575	1.805
<p>Title: Environmental quality technology demonstration and validation: Environmental Toolkit for Expeditionary Operations</p> <p>Description: Conduct pilot-scale demonstration and validation studies to determine the effectiveness of basic technologies/ methods developed for rapidly collecting environmental data in the field for the purposes of siting bases in expeditionary and austere environments.</p> <p>FY 2019 Plans:</p>		-	-	1.275

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) E21 / <i>Environmental Quality Technology Dem/Val</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
Will demonstrate software and sensors package for environmental baseline evaluation capabilities with engineer soldiers. FY 2018 to FY 2019 Increase/Decrease Statement: FY19 is the first year of transition from BA2/BA3 research and development effort.			
Title: Environmental quality technology demonstration and validation: Fate and Risk Evaluation System for Contaminants Description: Validate computational capabilities for multi-purpose evaluation of Emerging Contaminants fate and transport as well as for human and ecosystem health risk management in multimedia environmental modeling system. FY 2019 Plans: Will demonstrate software for environmental fate and transport data with user community for evaluation. FY 2018 to FY 2019 Increase/Decrease Statement: FY19 is the first year of transition from BA2/BA3 research and development effort.	-	-	1.254
Title: Environmental quality technology demonstration and validation: Low Global Warming Potential (LGWP) Alternatives to Ozone Depleting Substances (ODS) Description: Evaluate low GWP ODS alternatives being developed by industry to assess their toxicity and flammability hazards and verify their acceptability in military unique refrigeration and fire suppression applications. FY 2019 Plans: Will demonstrate lower GWP, non-ODS fire suppression agent in handheld fire extinguishers. FY 2018 to FY 2019 Increase/Decrease Statement: FY19 is the first year of transition from BA2/BA3 research and development efforts.	-	-	0.109
Accomplishments/Planned Programs Subtotals	5.034	6.677	9.879

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 06I: POLLUTION PREVENTION TECH SUPPORT	0.105	0.710	0.923	-	0.923	0.562	0.605	0.614	0.651	0.000	4.170
Remarks											

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / Environmental Quality Technology Dem/Val	Project (Number/Name) E21 / Environmental Quality Technology Dem/Val

D. Acquisition Strategy

The project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. As part of the Army's Environmental Quality Technology Program, all technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. The Army's Environmental Technology Integrated Product Team conducts a thorough assessment and makes funding recommendations to senior Army environmental leadership. Efforts approved by senior Army environmental leadership receive Advanced Component Development and Prototype funding to fully demonstrate and validate the technology for transition to end users for follow on implementation.

E. Performance Metrics

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) E21 / <i>Environmental Quality Technology Dem/Val</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Toxic Metals Reduction Demonstration/Validation	[Redacted]																											
Airborne Lead Reduction Demonstration/Validation	[Redacted]																											
ESOH Impacts of Short-Term Noise Assessment Procedures Dem	[Redacted]																											
Advanced Water Reuse Technology for Fixed Installations	[Redacted]																											
Insensitive Munitions (IM) Wastewater Treatment	[Redacted]																											
Fate and Risk Evaluation System for Contaminants	[Redacted]																											
Environmental Toolkit for Expeditionary Operations	[Redacted]																											
Low Global Warming Potential Dem/Val	[Redacted]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / <i>Environmental Quality Technology Dem/Val</i>	Project (Number/Name) E21 / <i>Environmental Quality Technology Dem/Val</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Toxic Metals Reduction Demonstration/Validation	1	2015	4	2023
Airborne Lead Reduction Demonstration/Validation	1	2015	4	2023
ESOH Impacts of Short-Term Noise Assessment Procedures Demonstration/Validation	1	2016	4	2019
Advanced Water Reuse Technology for Fixed Installations	1	2016	4	2019
Insensitive Munitions (IM) Wastewater Treatment	1	2018	4	2022
Fate and Risk Evaluation System for Contaminants	1	2019	4	2021
Environmental Toolkit for Expeditionary Operations	1	2019	4	2022
Low Global Warming Potential Dem/Val	1	2019	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT
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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	-	2.211	2.588	3.687	-	3.687	4.448	4.463	4.556	5.637	0.000	27.590
691: <i>NATO Rsch & Devel</i>	-	2.211	2.588	3.687	-	3.687	4.448	4.463	4.556	5.637	0.000	27.590

A. Mission Description and Budget Item Justification

This Program Element (PE) implements the provisions of Title 10 United States (U.S.) Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through the application of emerging technologies, the conventional defense capabilities of the United States and our cooperative partners, including the North Atlantic Treaty Organization (NATO), U.S. major non-NATO allies and Friendly Foreign countries. Through technology sharing and joint equipment development these projects help reduce U.S. acquisition costs and leverage important technologies for the Army Transformation and the development of the Future Combat system. Cooperative efforts also improve multinational force compatibility with potential coalition partners through the development and use of similar equipment and improved interfaces. The program focuses specifically on international cooperative technology demonstration, validation, and interoperability of Army weapon and command, control, communications and information (C3I) systems, including the NATO Defense Against Terrorism initiatives. Projects are implemented through international agreements with foreign partners that define scope, cost and work sharing arrangements, management, contracting, security, data protection and third party transfers. Funds are used to pay for only the U.S. work share that occurs in the United States at U.S. Government and US contractor facilities.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	2.300	2.588	3.127	-	3.127
Current President's Budget	2.211	2.588	3.687	-	3.687
Total Adjustments	-0.089	0.000	0.560	-	0.560
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.088	-			
• Adjustments to Budget Years	-	-	0.560	-	0.560
• FFRDC Transfer	-0.001	-	-	-	-

Change Summary Explanation

Funding increase in FY19 of \$560K for economic adjustments.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT				Project (Number/Name) 691 / NATO Rsch & Devel			
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
691: NATO Rsch & Devel	-	2.211	2.588	3.687	-	3.687	4.448	4.463	4.556	5.637	0.000	27.590
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project implements the provisions of Title 10 United States (U.S.) Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through the application of emerging technologies, the conventional defense capabilities of the U.S. and our cooperative partners, including the North Atlantic Treaty Organization (NATO), U.S. major non-NATO allies and Friendly Foreign countries through technology sharing and joint equipment development, thereby reducing U.S. acquisition costs. Cooperative efforts also improve multinational force compatibility with potential coalition partners through the development and use of similar equipment and improved interfaces. The Project focuses specifically on international cooperative technology demonstration, validation, and interoperability of Army weapon and command, control, communications and information (C3I) systems, including the NATO Defense Against Terrorism initiatives. Activities are implemented through international agreements with foreign partners that define scope, cost and work sharing arrangements, management, contracting, security, data protection and third party transfers. Funds are used to pay for only the U.S. work share that occurs in the United States at U.S. Government and U.S. contractor facilities.

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

	FY 2017	FY 2018	FY 2019
Title: Armaments Cooperation Enterprise Support	1.671	1.979	2.810
Description: Armaments Cooperation Enterprise Support/ International Online (IOL) Development and Implementation NATO/ International Cooperative R&D (AR 70-41) and International Acquisition (AR 70-1, AR 70-3). The goal of this activity is to expand worldwide allied standardization and interoperability through cooperative Research and Development (R&D) and technology sharing per SECDEF guidance and especially in support of the U.S. Army. The execution AR 70-41 responsibilities requires DASA (DE&C) to conduct engagement with key strategy foreign partners in all regions of the world through the SNR(A) program, international agreement negotiations, and other bilateral and multilateral forums involving DASA (DE&C) personnel. This program will fund the travel costs and administrative support (studies, analysis, interpretation, equipment, etc.) required to participate internationally, such as the NATO Army Armaments Group (NAAG), Defense Against Terrorism (DAT) and to pursue new cooperative R&D initiatives and international cooperative agreements such as memoranda of understanding.			
FY 2018 Plans: Funds will allow the coordination for cooperative research, development and evaluation of defense technologies / systems / equipment plus joint production and follow-on support of defense systems or equipment and the procurement of foreign technologies.			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Funds will allow the coordination for cooperative research, development and evaluation of defense technologies / systems / equipment plus joint production and follow-on support of defense systems or equipment and the procurement of foreign technologies.				
FY 2018 to FY 2019 Increase/Decrease Statement: Increased activity related to worldwide allied standardization and interoperability.				
Title: Communications Interoperability, and Electronics Technologies		0.125	0.141	0.203
Description: The goal of this activity is to develop technologies that enable interoperability among partner countries' command, control, communications, sensors, and information systems. Efforts include development of a single solution standard avoiding development of multiple unique solutions and leverage existing interoperability standards developed by NATO. Such standards include common doctrine, technical and procedural specifications to make better use of existing information, shared data, leveraged national operating picture capabilities and enable the development of interoperability of data, databases, applications, security domains and national networks architectures. Includes efforts from areas formerly titled Multi-National Network Enabled Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification, and Multilateral Interoperability Program.				
FY 2018 Plans: FY18 funding will be used to pursue cooperative projects that were postponed such as: the Coalition Wideband Networking Waveform Phase II, 5-Power-Net-centric Command and Control Interoperability projects.				
FY 2019 Plans: FY 2019 funds include efforts from areas formerly titled Multi-National Network Enabled Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification, and Multilateral Interoperability Program.				
FY 2018 to FY 2019 Increase/Decrease Statement: Economic adjustments revised.				
Title: Senior National Representatives (Army) (SNR-(A))		0.013	0.015	0.021
Description: Senior National Representatives (Army) (SNR-(A)) Projects (Partners: France, Germany, United Kingdom and Italy): Supports harmonization of programs at various levels: exchanging information, identifying knowledge gaps and conducting feasibility studies to further promote cooperative development; standardizing, fielding and road-mapping various processes; distributing the workload among the different nations. Technology Demonstrations hosted by the U.S. reps to Land Group 6, NATO Army Armaments Group (NAAG), will provide an opportunity to observe and demonstrate the current and future capability of participating NATO nations with a view to assisting future operational and materiel interoperability. Army support of NAAG studies, analysis and technology demonstrations.				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>FY 2018 Plans: FY18 funding will be used to pursue cooperative initiatives (i.e., forums and engagement with long-standing foreign partners to identify interoperability gaps and develop necessary standardization programs).</p> <p>FY 2019 Plans: Funds will be used to pursue cooperative initiatives that were postponed, cancelled or not pursued due to funding reductions in previous years such as forums and engagement with long-standing foreign partners to identify interoperability gaps and develop necessary standardization programs.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Economic adjustments revised.</p>			
<p>Title: Weapons and Munitions Technologies</p> <p>Description: The goal of this activity is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for Army weapons systems and associated munitions. Areas of cooperation include fuzing and warhead systems, guidance systems, counter improvised explosive device neutralization, directed energy, and fire control systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p>FY 2018 Plans: Weapons and munitions technologies (Partners: France, Germany, Italy, UK): The Participants in this program will develop an automated software interface between their national field artillery command and control systems. The nations will be able to receive and provide mutual fire support (i.e. cannon and rocket fire) in combined operations more rapidly and with minimal errors.</p> <p>FY 2019 Plans: Weapons and munitions technologies (Partners: France, Germany, Italy, UK): The Participants in this program will develop an automated software interface between their national field artillery command and control systems. The nations will be able to receive and provide mutual fire support (i.e. cannon and rocket fire) in combined operations more rapidly and with minimal errors.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Economic adjustments revised.</p>	0.100	0.113	0.163
<p>Title: Ground Systems Technologies</p> <p>Description: The goal of this activity is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve survivability, weapons, ground platforms (manned and unmanned), and mobility and counter-mobility</p>	0.100	0.113	0.163

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>to provide soldiers with unmatched offensive and defensive capabilities in weapons and military vehicles. Areas of cooperation include ground systems design, propulsion, structures, robotics, alternative fuels and lubricants, systems integration, electronics, and power management. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p>FY 2018 Plans: FY 2018 funding will be used to fund the continuation of cooperative projects in armored vehicle underbody blast protection and unmanned ground vehicles such as Hybrid Electric Project Agreement between US and Japan.</p> <p>FY 2019 Plans: FY 2019 funding will be used to fund the continuation of cooperative projects in armored vehicle underbody blast protection and unmanned ground vehicles such as Hybrid Electric Project Agreement between US and Japan.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Economic adjustments revised.</p>				
<p>Title: Aviation Systems Technologies</p> <p>Description: The goal of this activity is to cooperate with partner countries to increase interoperability and develop jointly improved aerodynamics, aeromechanics, avionics, weapons and sensor integration, propulsion, and aviation autonomy technologies that improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for vertical lift aviation systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p>FY 2018 Plans: FY 2018 funding will be used to pursue cooperative projects (i.e., the development of advance rotorcraft technologies and improve systems that aid pilots and aircrew in degraded visual environments).</p> <p>FY 2019 Plans: FY 2019 funding will be used to pursue cooperative projects (i.e., the development of advance rotorcraft technologies and improve systems that aid pilots and aircrew in degraded visual environments).</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Economic adjustments revised.</p>		0.202	0.227	0.327
Accomplishments/Planned Programs Subtotals		2.211	2.588	3.687

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy		
<p>Acquisition Strategy: The goal of this program is to expand worldwide allied standardization interoperability through cooperative research and development (R&D) and technology sharing per SECDEF guidance and especially in support of the of the U.S. Army. All projects are test or technical demonstrations to feed into potential new requirements in support of Army Transformation to the Future Force or as product improvements to the Current Force.</p> <p>List of the programs curenly in place: Communications, Interoperability, and Electronics Technologies The goal of this project is to develop technologies that enable interoperability among partner countries' command, control, communications, sensors, and information systems. Efforts under this project include development of a single solution standard avoiding development of multiple unique solutions and leverage existing interoperability standards developed by NATO. Such standards include common doctrine, technical and procedural specifications to make better use of existing information, shared data, leverage national operating picture capabilities and enable the development of interoperability of data, databases, applications, security domains and national networks architectures. Includes projects formerly titled Multi-National Network Enabled Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification, and Multilateral Interoperability Program.</p> <p>Aviation Systems Technologies The goal of this project is to cooperate with partner countries to increase interoperability and develop jointly improved aerodynamics, aeromechanics, avionics, weapons and sensor integration, propulsion, and aviation autonomy technologies that improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for vertical lift aviation systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p>Ground Systems Technologies The goal of this project is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve survivability, weapons, ground platforms (manned and unmanned), and mobility and counter-mobility to provide soldiers with unmatched offensive and defensive capabilities in weapons and military vehicles. Areas of cooperation include ground systems design, propulsion, structures, robotics, alternative fuels and lubricants, systems integration, electronics, and power management. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p>Weapons and Munitions Technologies</p>		

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel

The goal of this project is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for Army weapons systems and associated munitions. Areas of cooperation include fuzing and warhead systems, guidance systems, counter improvised explosive device neutralization, directed energy, and fire control systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.

Armaments Cooperation Enterprise Support

The goal of this program is to expand worldwide allied standardization and interoperability through cooperative research and development (R&D) and technology sharing per SECDEF guidance and especially in support of the U.S. Army. This program will fund the travel costs and administrative support (studies, analysis, interpretation, equipment, etc.) required to participate internationally, such as the North Atlantic Treaty Organization (NATO) Army Armaments Group (NAAG), Defense Against Terrorism (DAT) and to pursue new cooperative R&D initiatives and international cooperative agreements such as memoranda of understanding. This program will also include: the United States' share of costs of the NATO Civil Budget, Chapter IX, which funds the NATO Industrial Advisory Group (NIAG) and the Special Fund for Cooperative Planning (U. S. Army is Executive Agent for this NATO bill); the Technical Cooperation Program, and Army armaments cooperation working groups with many nations.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
ArmamentsCooperation Enterprise Support	MIPR	DASA DEC HQDA : Ft Belvoir, VA	0.010	-		-		-		-		-	0.000	0.010	-
Weapons and Munitions	TBD	CECOM : Aberdeen Proving Ground, MD	0.008	-		-		-		-		-	0.000	0.008	-
Communications Interoperability and Electronic Technologies Interoperability	MIPR	SPAWAR : Various	0.010	-		-		-		-		-	0.000	0.010	-
Ground Systems Technologies	MIPR	TARDEC : Warren, MI	0.010	-		-		-		-		-	0.000	0.010	-
Chemical and Biological Technologies	MIPR	Aberseen Proving Groun : MD	0.010	-		-		-		-		-	0.000	0.010	-
Subtotal			0.048	-		-		-		-		-	0.000	0.048	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.100	-		-		-		-		-	0.000	0.100	-
Communications, Interoperability, and Electronics Technologies	MIPR	CECOM, JTRS, COALWNW, JTNC, SPAWAR : San Diego, CA, various	0.529	-		-		-		-		-	0.000	0.529	-
Weapons and Munitions	Various	ARDEC, PEO AMMO, PM-CAS : VARIOUS	0.752	-		-		-		-		-	0.000	0.752	-
Aviation Systems Technologies	Various	AMRDEC : RED STONE, VARIOUS	0.175	-		-		-		-		-	0.000	0.175	-
Ground Systems Technology	FFRDC	Various : Various	0.125	-		-		-		-		-	0.000	0.125	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603790A / NATO RESEARCH AND DEVELOPMENT				691 / NATO Rsch & Devel							
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
SNR(A)	C/TBD	ARDEC: Arlington, VA : Various	9.012	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			10.693	-		-		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armaments Cooperation Enterprise Support	C/FFP	LSS/GDIT : Fairfax, VA	3.002	1.760		1.980		1.987		-		1.987	0.000	8.729	-
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.100	-		-		0.600		-		0.600	0.000	0.700	-
Communications, Interoperability, and Electronics Technologies	MIPR	Joint Tactical Radio (JTRS), JTNC, COALWNW, SPAWAR, CERDEC, ARDEC W1DF : San Diego, CA, Red Stone Arsenal	0.793	0.025		0.141		0.300		-		0.300	0.000	1.259	-
Aviation Systems Technologies	MIPR	RDECOM/ AMRDEC : Red Stone Arsenal	0.385	0.200		0.225		0.300		-		0.300	0.000	1.110	-
Ground Systems Technology	MIPR	TARDEC : Various	0.265	0.100		0.113		-		-		-	0.000	0.478	-
Weapons and Munitions	Various	CECOM, ARDEC, AMMO, PEO C3T : Aberdeen Proving Ground, Various	0.826	0.100		0.113		0.500		-		0.500	0.000	1.539	-
Soldier Technologies	TBD	Various : Various	0.320	0.026		-		-		-		-	0.000	0.346	-
SNR(A)	C/TBD	ARL, HQDA, JCGISR: Army : Various	2.302	-		0.016		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel
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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Chemical & Biological Defense Technologies	MIPR	ECBC : Edgewood, Aberdeen, MD	0.270	-		-		-		-		-	0.000	0.270	-
Subtotal			8.263	2.211		2.588		3.687		-		3.687	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Communications, Interoperability, and Electronics Technologies	Various	JTRN, JTNC, COALWNW, CERDEC, NIGHT VISION : SPAWAR	0.444	-		-		-		-		-	0.000	0.444	-
Weapons and Munitions	TBD	ARDEC, PEO AMMO, ASCA : Various	0.200	-		-		-		-		-	0.000	0.200	-
Aviation Systems Technologies	TBD	RDECOM, AMRDEC : RED STONE	0.080	-		-		-		-		-	0.000	0.080	-
Ground Systems Technologies	MIPR	TARDEC : Various	0.050	-		-		-		-		-	0.000	0.050	-
Subtotal			0.774	-		-		-		-		-	0.000	0.774	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		19.778	2.211	2.588	3.687	-	3.687	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
N/A																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO RESEARCH AND DEVELOPMENT	Project (Number/Name) 691 / NATO Rsch & Devel

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2017	4	2017

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603801A / <i>Aviation Advanced Development</i>
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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	-	7.702	14.055	10.793	-	10.793	21.690	54.367	185.304	222.394	Continuing	Continuing
B47: <i>Future Vertical Lift Medium</i>	-	7.702	14.055	10.793	-	10.793	21.690	54.367	185.304	222.394	Continuing	Continuing

A. Mission Description and Budget Item Justification

Future Vertical Lift (FVL) is an initiative to develop a family of vertical lift aircraft for the United States Armed Forces. FVL was established in 2009 by the Secretary of Defense to focus all Department of Defense (DoD) vertical lift capabilities and technology development, as well as retaining long-term engineering capabilities. In October 2011, the Deputy Secretary of Defense issued the FVL Strategic Plan to outline a joint approach for the next generation vertical lift aircraft for all military services. The Strategic Plan provided a foundation for replacing the current fleet with advanced capability by shaping the development of vertical lift aircraft for the next 25 to 40 years. In 2017, the FVL was identified as one of the Army's eight Cross Functional Team Pilots, derived from the six Chief of Staff, Army modernization priorities. The development and fielding of FVL will significantly improve vertical lift capabilities providing critical aviation support to the Joint warfighting community. Increases in maneuverability, range, speed, payload, survivability, reliability, and reduced logistical footprint can only be achieved through the FVL approach of developing a new aircraft design. FVL will integrate advancements in technologies and design configurations balanced with appropriate trades to ensure affordability.

PE 0603801A, Project B47, Future Vertical Lift funding provides for the development of a Capability Set 3 aircraft system within the FVL family of systems. FVL Capability Set 3 aircraft will conduct Air Assault, Amphibious Assault, Urban Assault/Security, Attack, Maritime Interdiction, Medical Evacuation (MEDEVAC), Humanitarian Assistance/Disaster Relief (HA/DR), Tactical Resupply, Direct Action (DA), Non-Combatant Evacuation Operation (NEO) and Combat Search and Rescue (CSAR) operations in support of Army, including Army Special Operations Command, Marine Corps and Joint forces. The FVL Capability Set 3 platform will significantly increase speed, range, mobility, and payload over current US Army H-60 and US Marine Corps H-1 aircraft and provide Combatant Commanders with tactical capabilities at greatly increased operational and strategic distances. The FVL Capability Set 3 Materiel Development Decision was approved in October 2016. FY 2017 funding provided for Analysis of Alternatives (AoA) modeling, simulation, and analysis. FY 2018 funding completes development and execution of the AoA and begins acquisition planning and strategy development. FY19 funding will support the completion of a Technical Readiness Assessment and acquisition planning and strategy development, systems engineering support to decompose the draft Capability Development Document (CDD), and the development of Milestone A documentation and Technology Maturation and Risk Reduction (TMRR) Contract Requirements Package.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603801A / <i>Aviation Advanced Development</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	10.014	14.055	10.909	-	10.909
Current President's Budget	7.702	14.055	10.793	-	10.793
Total Adjustments	-2.312	0.000	-0.116	-	-0.116
• Congressional General Reductions	-0.005	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.926	-			
• SBIR/STTR Transfer	-0.381	-			
• Adjustments to Budget Years	-	-	-0.116	-	-0.116

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603801A / Aviation Advanced Development				Project (Number/Name) B47 / Future Vertical Lift Medium			
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
B47: Future Vertical Lift Medium	-	7.702	14.055	10.793	-	10.793	21.690	54.367	185.304	222.394	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Future Vertical Lift (FVL) is an initiative to develop a family of vertical lift aircraft for the United States Armed Forces. FVL was established in 2009 by the Secretary of Defense to focus all Department of Defense (DoD) vertical lift capabilities and technology development, as well as retaining long-term engineering capabilities. In October 2011, the Deputy Secretary of Defense issued the FVL Strategic Plan to outline a joint approach for the next generation vertical lift aircraft for all military services. The Strategic Plan provided a foundation for replacing the current fleet with advanced capability by shaping the development of vertical lift aircraft for the next 25 to 40 years. In 2017, the FVL was identified as one of the Army's eight Cross Functional Team Pilots, derived from the six Chief of Staff, Army modernization priorities. The development and fielding of FVL will significantly improve vertical lift capabilities providing critical aviation support to the Joint warfighting community. Increases in maneuverability, range, speed, payload, survivability, reliability, and reduced logistical footprint can only be achieved through the FVL approach of developing a new aircraft design. FVL will integrate advancements in technologies and design configurations balanced with appropriate trades to ensure affordability.

PE 0603801A, Project B47, Future Vertical Lift funding provides for the development of a Capability Set 3 aircraft system within the FVL family of systems. FVL Capability Set 3 aircraft will conduct Air Assault, Amphibious Assault, Urban Assault/Security, Attack, Maritime Interdiction, Medical Evacuation (MEDEVAC), Humanitarian Assistance/Disaster Relief (HA/DR), Tactical Resupply, Direct Action (DA), Non-Combatant Evacuation Operation (NEO) and Combat Search and Rescue (CSAR) operations in support of Army, including Army Special Operations Command, Marine Corps and Joint forces. The FVL Capability Set 3 platform will significantly increase speed, range, mobility, and payload over current US Army H-60 and US Marine Corps H-1 aircraft and provide Combatant Commanders with tactical capabilities at greatly increased operational and strategic distances. The FVL Capability Set 3 Materiel Development Decision was approved in October 2016. FY 2017 funding provided for Analysis of Alternatives (AoA) modeling, simulation, and analysis. FY 2018 funding completes development and execution of the AoA and begins acquisition planning and strategy development. FY19 funding will support the completion of a Technical Readiness Assessment and acquisition planning and strategy development, systems engineering support to decompose the draft Capability Development Document (CDD), and the development of Milestone A documentation and Technology Maturation and Risk Reduction (TMRR) Contract Requirements Package.

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

	FY 2017	FY 2018	FY 2019
Title: Future Vertical Lift (FVL) Analysis of Alternatives	2.430	3.338	-
Description: FVL Analysis of Alternatives modeling, simulation, and analysis performed by U.S. Army TRADOC Analysis Center, U.S. Army Materiel Systems Analysis Activity and other supporting agencies.			
FY 2018 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603801A / Aviation Advanced Development	Project (Number/Name) B47 / Future Vertical Lift Medium		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Complete Analysis of Alternatives Support to include risk, cost and affordability, sustainment and trades. Begin the development of reporting documentation and staffing. FY 2018 to FY 2019 Increase/Decrease Statement: AoA will be fully funded in FY18, with final report released in 1st Quarter FY19.				
Title: Engineering Services / Research Studies Description: Engineering research, planning, modeling, analyses and reviews supporting the FVL acquisition program. FY 2018 Plans: Continue to support FVL AoA modeling, simulation and analysis. Initiate Test Evaluation and Master Plan (TEMP) and Draft Capability Development Document (CDD) documentation. FY 2019 Plans: Conduct Initial Readiness Assessment, prepare Systems Engineering Decomposition and Translation of Draft Capability Development Documentation (CDD) into Weapon System Specification and initiate Milestone A documentation development. FY 2018 to FY 2019 Increase/Decrease Statement: Engineering Services will continue in FY19.		4.527	7.422	7.150
Title: Program Management Description: Oversight and management of FVL acquisition program. FY 2018 Plans: Develop Acquisition Strategy and Life Cycle Cost Estimate for the FVL program. Continue oversight and program management support for FVL Analysis of Alternatives and research studies. FY 2019 Plans: Complete Acquisition Planning and Strategy Development for FVL Capability Set 3 aircraft. Begin development of Milestone A documentation and TMRR Contracts Requirements Package. FY 2018 to FY 2019 Increase/Decrease Statement: Program Management funding will continue in FY19.		0.320	2.404	2.424
Title: Supportability Analysis and Acquisition Support Description: Acquisition and supportability planning and development of documentation on the FVL program. FY 2018 Plans:		0.425	0.891	1.219

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603801A / Aviation Advanced Development	Project (Number/Name) B47 / Future Vertical Lift Medium

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
Continue to support FVL AoA Supportability, development of Core Logistics Analysis Documentation, and consolidate results to be documented in the Life Cycle Sustainment Plan.			
FY 2019 Plans: Complete the development of the Life Cycle Sustainment Plan and participate in the development of the Contracts Requirements Package to support the TMRR Request for Proposal (RFP) release.			
FY 2018 to FY 2019 Increase/Decrease Statement: Acquisition and Logistics Support will increase to support the documentation required for the RFP release.			
Accomplishments/Planned Programs Subtotals	7.702	14.055	10.793

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• 313: Aviation Advanced Technology	80.909	147.882	115.712	-	115.712	97.125	93.750	95.603	97.515	0.000	728.496

Remarks
PE 0603003A/313 Advanced Rotary-wing Vehicle Technology funds the Joint Multi-Role (JMR) Technology Demonstrator (TD) and other Army Science & Technology (S&T) projects to mature, demonstrate and integrate components, subsystems and systems for vertical lift and unmanned air vehicle technologies. This will enable Army aviation modernization and reduce risk for FVL. JMR TD is not an FVL prototyping effort nor indicative of an end state FVL performance requirement.

D. Acquisition Strategy
An Analysis of Alternatives (AoA) was initiated in 3rd Quarter FY 2017 to assess the technical feasibility, operational feasibility, technical risk, and affordability of potential materiel solutions. The AoA will be informed by previous studies, ongoing Advanced Technology Development S&T projects, and input from Government, Industry and Academia. The results of the AoA and Technology Readiness Assessments will be available to support a projected Milestone A Decision in 3rd Quarter FY 2021 and a Technology Maturation and Risk Reduction (TMRR) RFP Release in 3rd Quarter FY 2021. After a successful Source Selection Evaluation Board, the Army will award competitive TMRR contracts to complete preliminary design and risk reduction testing. At the end of TMRR, and after a successful Milestone B Decision, the Army will award an Engineering and Manufacturing Development (EMD) contract to complete development and testing of the system before entering the Production and Deployment phase in the FY 2030 timeframe.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603801A / Aviation Advanced Development				B47 / Future Vertical Lift Medium							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management	MIPR	FVL Program Office : Redstone Arsenal, AL	-	0.320	Jun 2017	2.404	Nov 2017	2.424	Nov 2018	-		2.424	Continuing	Continuing	Continuing
Subtotal			-	0.320		2.404		2.424		-		2.424	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Analysis of Alternatives (AoA)	TBD	TRADOC Analysis Center : Fort Leavenworth, KS	-	2.430	Jun 2017	3.338	Nov 2017	-		-		-	0.000	5.768	-
Subtotal			-	2.430		3.338		-		-		-	0.000	5.768	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Engineering Services / Research Studies - Organic	MIPR	FVL Program Office : Redstone Arsenal AL	-	0.549	Jun 2017	4.091	Nov 2017	4.900	Nov 2018	-		4.900	Continuing	Continuing	Continuing
Engineering Services / Research Studies - Other	C/FFP	GSA : Atlanta, GA	-	3.978	Aug 2017	3.331	Aug 2018	2.250	Aug 2019	-		2.250	Continuing	Continuing	Continuing
Acquisition and Supportability Analysis	MIPR	Army Logistics Command / Army Contracting Command : Redstone Arsenal, AL	-	0.425	Jun 2017	0.891	Nov 2017	1.219	Nov 2018	-		1.219	Continuing	Continuing	Continuing
Subtotal			-	4.952		8.313		8.369		-		8.369	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018				
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603801A / Aviation Advanced Development				Project (Number/Name) B47 / Future Vertical Lift Medium				
	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	-	7.702	14.055		10.793		-		10.793	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603801A / Aviation Advanced Development	Project (Number/Name) B47 / Future Vertical Lift Medium

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Matériel Development Decision	1 MDD																											
Analysis of Alternatives																												
Weapons System Specification Development																												
Milestone A Documentation and Contracts Requirements Package																												
Projected Milestone A																												
Request for Proposal Release																												
Proposal Preparation																												
Source Selection Evaluation Board																												
Technology Maturation and Risk Reduction Contract Award																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603801A / <i>Aviation Advanced Development</i>	Project (Number/Name) B47 / <i>Future Vertical Lift Medium</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Material Development Decision	1	2017	1	2017
Analysis of Alternatives	3	2017	1	2019
Weapons System Specification Development	1	2019	3	2020
Milestone A Documentation and Contracts Requirements Package	1	2019	3	2021
Projected Milestone A	3	2021	3	2021
Request for Proposal Release	4	2021	4	2021
Proposal Preparation	4	2021	1	2022
Source Selection Evaluation Board	1	2022	1	2023
Technology Maturation and Risk Reduction Contract Award	1	2023	1	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>
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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	-	17.445	35.333	14.248	-	14.248	14.387	17.937	17.779	32.428	0.000	149.557
<i>526: Marine Orien Log Eq Ad</i>	-	3.625	4.345	3.896	-	3.896	3.916	3.923	3.914	3.608	0.000	27.227
<i>EW8: Armored Engineer Vehicles</i>	-	0.000	12.200	1.484	-	1.484	1.977	1.977	2.100	6.963	0.000	26.701
<i>G11: Adv Elec Energy Con Ad</i>	-	5.051	6.524	3.335	-	3.335	3.372	7.201	7.405	17.413	0.000	50.301
<i>K39: Field Sustainment Support Ad</i>	-	2.528	2.429	2.311	-	2.311	1.675	1.720	1.773	1.807	0.000	14.243
<i>K41: Water And Petroleum Distribution - Ad</i>	-	2.237	4.773	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.010
<i>VR8: Combat Service Support Systems - Ad</i>	-	4.004	5.062	3.222	-	3.222	3.447	3.116	2.587	2.637	0.000	24.075

A. Mission Description and Budget Item Justification

This program element supports advanced component development and prototypes of new and improved technologies for combat support and combat service support equipment essential to sustaining combat operations. Advancements in bridging, electric power generators, material-handling, environmental control, shelter systems, cargo aerial delivery, field service systems, mortuary affairs equipment and petroleum equipment are necessary to improve safety and increase the tactical mobility, operational capability, lethality and survivability on the digital battlefield and to provide for greater sustainment while reducing the logistics support burden. Army Watercraft funding supports initiatives to enhance the seaworthiness, safety, survivability, supportability, energy efficiency, environmental, regulatory compliance and reliability of existing systems.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	20.834	35.333	18.397	-	18.397
Current President's Budget	17.445	35.333	14.248	-	14.248
Total Adjustments	-3.389	0.000	-4.149	-	-4.149
• Congressional General Reductions	-0.008	-			
• Congressional Directed Reductions	-2.708	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.673	-			
• Adjustments to Budget Years	-	-	-4.149	-	-4.149

Change Summary Explanation

Program summary change is due to reprogramming of funds to pay higher priority Army critical requirements.

The FY 2019 funding request was reduced by \$4.761 million to account for the availability of prior year execution balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>				Project (Number/Name) 526 / <i>Marine Orien Log Eq Ad</i>			
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
526: <i>Marine Orien Log Eq Ad</i>	-	3.625	4.345	3.896	-	3.896	3.916	3.923	3.914	3.608	0.000	27.227
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program element supports projects and studies for advanced component development, including prototypes of equipment and sub-systems which provide critical capabilities for Unified Land Operations (ULO), by extending the Commander's available maneuver space into and throughout the littorals, inland waterways and near coastal regions. Army watercraft equipment enables the conduct of riverine, Logistics-over-the-Shore (LOTS) and Joint Logistics-over-the-Shore (JLOTS), inter and intra-theater transport, movement and maneuver, mission command and sustainment, as identified in DODD 5100.01 (Functions of the Department of Defense and its major components). Army Watercraft exploit the inland waterways and littoral regions as waterborne maneuver and supply routes, conducting operations through littoral entry points (developed, undeveloped, and austere access points) and in non-permissive, and/or denied access scenarios. The Army uses a spectrum of Army Watercraft systems, from heavy sustainment ocean going landing craft capable of intra-theater and ship to shore transport and undeveloped beach or harbor access, to oceangoing and harbor utility tug boats and barge derricks for transport and denied port/salvage operations, and modular causeway systems for (LOTS/JLOTS). The funding supports initiatives to enhance the seaworthiness, safety, survivability, supportability, energy efficiency, environmental, regulatory compliance and reliability of existing systems. Funded efforts will address critical gaps in these areas for the current fleet, while at the same time researching, developing and testing emergent technologies. To support future acquisitions and future fleet planning, funding efforts will include conducting trade studies, Business Case Analyses (BCA) to inform the requirement development process, and support Analysis of Alternatives (AoA). The funding enables our compliance with the National Defense Authorization Act of 1996 and 502(6) of the Clean Water Act and compliance with Environmental protection Agency (EPA) emission standards.

FY19 funding will primarily support maturation of the Service Life Extension Program (SLEP) design for the Modular Warping Tug (MWT), support continued integration of Force Protection, and environmental projects.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: At Sea Transfer Technology	1.175	2.150	2.150	-	2.150
Description: At Sea Transfer Technology enables roll on and roll off (RO/RO) capability from vessels at sea; and causeway transport of vehicles and equipment to the beach or shore. The current effort serves to inform development of a Service Life Extension Program (SLEP) for the Modular Warping Tug (MWT) and Causeway Ferry (CF) which are principle working platforms in the Modular Causeway System (MCS).					
FY 2018 Plans: -Continue to develop the MWT/CF SLEP Design Solution; transition design to prototype.					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) 526 / <i>Marine Oriented Log Eq Ad</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
-Continue development of the MWT/CF Technical Data Package (TDP).					
FY 2019 Base Plans: Complete SLEP design prototype. -Perform testing of MWT/CF SLEP prototype -Complete MWT/CF Production Level TDP.					
Title: Environmental Compliance Projects					
Description: Environmental projects enable compliance with requirements as defined in law under Uniform National Discharge Standards (UNDS) and Environmental Protection Agency (EPA) emissions standards. The EPA reviews the UNDS Code of Federal Regulations (CFR) language in five year increments separated into three batches (types of discharge). This is an ongoing assessment of statutory language which may or may not result in material solution change.					
FY 2018 Plans: - Funding to continue identification of Environmental Compliance Technologies IAW evolving statutory and regulatory requirements. - Continue MSD shipboard test and evaluation. - Continue OWS requirement and capability analysis. - Continue Clean Ballast Water requirement and capability analysis.					
FY 2019 Base Plans: - Funding to continue identification of Environmental Compliance Technologies IAW evolving statutory and regulatory requirements. - Continue MSD shipboard test and evaluation. - Continue OWS requirement and capability analysis. - Continue Clean Ballast Water requirement and capability analysis.					
FY 2018 to FY 2019 Increase/Decrease Statement: Costs associated with this requirement have decreased due to progression of the projects.					
	0.811	1.055	0.506	-	0.506
Title: Force Protection Capability					
Description: Army Watercraft Systems (AWS) Force Protection capability is limited to defensive measures. Current efforts include development of gunner station and weapon station locations, integration of Common Remotely Weapon Station (CROWS) and non-lethal Escalation of Force (EoF). The EoF capability includes					
	0.768	0.770	0.770	-	0.770

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) 526 / <i>Marine Oriented Log Eq Ad</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
white light, green dazzler, an acoustic hailing device, percussion grenades, and Forward Looking Infra-Red (FLIR). FY 2018 Plans: -Develop CROWS Integration kit for LCU 2000. -Continue EoF development. FY 2019 Base Plans: Install and test CROWS aboard LSV-7 class.					
Title: Army Watercraft Program Support Description: Matrix Salary Support includes Program Management and System Engineering resources required to manage the program projects and provide contractor oversight. It also includes benefits, travel, personnel training and other Government costs required to retain a professional acquisition workforce. FY 2018 Plans: -PM/Matrix Support. -Fund Navy for UNDS analysis and committee representation. FY 2019 Base Plans: -Matrix Support -Fund Navy for UNDS analysis and committee representation.	0.371	0.370	0.370	-	0.370
Title: Energy Efficiency and Emissions Compliance Description: Energy efficiency and emission compliance of Army Watercraft explores emerging technologies to improve power consumption, conform with regulation, and reduce the environmental impact of Army Watercraft.	0.500	-	-	-	-
Title: Trade Studies and Business Analyses Description: Conduct Affordability and Feasibility Studies, to include support of Analysis of Alternatives for future vessel platforms. FY 2019 Base Plans: Support initiation of Feasibility Study for future vessel platforms. FY 2018 to FY 2019 Increase/Decrease Statement:	-	-	0.100	-	0.100

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) 526 / <i>Marine Oriented Log Eq Ad</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Support Feasibility study will begin for MSV(H) in FY19					
Accomplishments/Planned Programs Subtotals	3.625	4.345	3.896	-	3.896

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
• MA4501: <i>MODIFICATION KITS</i>	46.363	26.018	25.201	-	25.201	28.122	26.466	22.310	30.770	0.000	205.250
• MA4502: <i>INSTALLATION OF MODIFICATIONS</i>	17.112	26.490	15.886	-	15.886	4.667	4.812	4.031	4.204	0.000	77.202
• M11101: <i>Army Watercraft Esp</i>	21.860	20.110	27.711	-	27.711	36.933	46.100	40.957	38.330	0.000	232.001
• ML5355: <i>Items Less Than \$5.0M (Float/Rail)</i>	1.967	2.877	8.385	-	8.385	2.422	1.931	1.943	0.994	0.000	20.519

Remarks

- FY 2017 Accomplishments:
- Awarded MWT/CF SLEP Design contract 12 May 2017 with Contract Mod awarded 30 Sep 2017.
 - Completed MWT/CF Electrical Design Study 30 Sep 2017.
 - Developed Technical Data Package (TDP) for 4 of 9 MWT/CF modules.
 - Completed 100% of the Flexor Study.
 - LSV-1 installed the Chlorinator aboard the vessel 24 April -12 May 2017; evaluation is ongoing.
 - Marine Sanitation Device (MSD) procured for installation aboard the LSV-1 on 4-15 Dec 2017.

D. Acquisition Strategy

Leverage government and public research centers (TARDEC and Naval Surface Warfare Center (NSWC) Philadelphia) and known public research institutes (Battelle) along with associated contract mechanisms to prototype, test, and evaluate component technologies that may be applicable to the current and future Army Watercraft fleet.

E. Performance Metrics

- Integrated Master Schedule (IMS) whereby cost, schedule, and performance including critical path can be measured.
- Technical Reviews with entrance and exit criteria.
- Deliverables: drawings, test data and test reports, studies and analytical reports, final project reports.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) 526 / <i>Marine Oriented Log Eq Ad</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Force Protection, Escalation of Force (EoF) Development (i.e. CROWS)	MIPR	TARDEC : Warren, MI	1.881	0.768	Jan 2017	0.770	Feb 2018	0.770	Feb 2019	-		0.770	Continuing	Continuing	-
At Sea Transfer Systems (Modular Warping Tug / Causeway Ferry)	SS/CPFF	Program Support Center (PSC) - Health and Human Services : Bethesda, MD	1.041	1.175	Jan 2017	2.150	Jan 2018	2.150	May 2019	-		2.150	Continuing	Continuing	-
Environmental Compliance Uniform National Discharge Standards (UNDS)	MIPR	TARDEC, Carderock : Warren, MI and Maryland	2.011	0.811	Dec 2016	1.055	Feb 2018	0.506	Jan 2019	-		0.506	Continuing	Continuing	-
Energy Efficiency and Emissions Compliance	C/ FFPLOE	Battelle : Columbus, OH	0.966	0.500	May 2017	-		-		-		-	0.000	1.466	-
Army Watercraft Module, Berthing (AWMB) Development	C/ FFPLOE	PM Force Sustainment Systems : Natick, MA	1.504	-		-		-		-		-	0.000	1.504	-
Trade Study Analyses	MIPR	NAVSEA : Philadelphia, PA	-	-		-		0.100	Sep 2019	-		0.100	0.000	0.100	-
Subtotal			7.403	3.254		3.975		3.526		-		3.526	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Army Watercraft Program Support	MIPR	Detroit Arsenal PMs, TARDEC, ILSC. : Warren, MI	0.987	0.371	Dec 2016	0.370	Nov 2017	0.370	Nov 2018	-		0.370	Continuing	Continuing	-
Subtotal			0.987	0.371		0.370		0.370		-		0.370	Continuing	Continuing	N/A

Remarks
Matrix Employees are funded through a reimbursable MIPR and disbursed monthly.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018			
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>				Project (Number/Name) 526 / <i>Marine Orien Log Eq Ad</i>				
	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	8.390	3.625	4.345		3.896	-	3.896	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) 526 / <i>Marine Oriented Log Eq Ad</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Army Watercraft Program Support																												
Force Protection: Common Remotely Operated Weapon Station																												
Force Protection: CROWS on LSV-7 Class																												
CROWS on LSV-7																												
Force Protection: CROWS on LCU 2000 Class																												
CROWS on LCUXXXX																												
At Sea Transfer Technology																												
Modular Warping Tug (MWT) / Causeway Ferry (CF)																												
MWT / CF - SLEP Development Contract																												
MWT / CF - SLEP Prototype and Proof Concept																												
MWT / CF - SLEP Testing																												
Environmental Compliance																												
Uniformed National Discharge Standards (UNDS)																												

4

7

2

3

Prototype and Proof

6

Testing

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) 526 / <i>Marine Orien Log Eq Ad</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
UNDS Batch 2					▲ 1																							
UNDS Batch 3					▲ 5																							
Trade Studies and Business Analyses					■																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) 526 / <i>Marine Oriented Log Eq Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Army Watercraft Program Support	4	2016	4	2023
Force Protection: Common Remotely Operated Weapon Station (CROWS)	4	2016	4	2023
Force Protection: CROWS on LSV-7 Class	4	2016	4	2018
CROWS on LSV-7	4	2018	4	2018
Force Protection: CROWS on LCU 2000 Class	4	2016	4	2019
CROWS on LCUXXXX	4	2019	4	2019
At Sea Transfer Technology	4	2016	4	2023
Modular Warping Tug (MWT) / Causeway Ferry (CF)	1	2018	4	2019
MWT / CF - SLEP Development Contract	3	2018	3	2018
MWT / CF - SLEP Prototype and Proof Concept	3	2018	3	2018
MWT / CF - SLEP Testing	2	2019	2	2019
Environmental Compliance	4	2016	4	2023
Uniformed National Discharge Standards (UNDS)	4	2016	4	2023
UNDS Batch 2	2	2018	2	2018
UNDS Batch 3	2	2019	2	2019
Trade Studies and Business Analyses	4	2019	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>					Project (Number/Name) EW8 / <i>Armored Engineer Vehicles</i>		
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
EW8: <i>Armored Engineer Vehicles</i>	-	0.000	12.200	1.484	-	1.484	1.977	1.977	2.100	6.963	0.000	26.701
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
The Joint Assault Bridge (JAB) was funded under PR 654804/H02 in FY17 and prior.

A. Mission Description and Budget Item Justification

This project supports live fire test and evaluation, initial operational test and evaluation and production qualification testing of the Joint Assault Bridge (JAB). This project also funds efforts to upgrade and modernize the Assault Bridging Management portfolio through the development of new systems and enhancement of existing systems such as the Mobile Armored Combat Earthmover (MACE). MACE will be replacing the aging M9 Armored Combat Earthmover (ACE).

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Title: Joint Assault Bridge (JAB)</p> <p>Description: The Joint Assault Bridge (JAB) provides the Army Mobility Augmentation Companies (MACs) and Armor Brigade Combat Teams (ABCTs) Brigade Engineer Battalions (BEBs) with a survivable, deployable and sustainable heavy assault bridging capability. The JAB System will provide a Gap Crossing Capability to cross wet or dry gaps to provide freedom of maneuver on the battlefield and keep pace with Abrams ABCT operations.</p> <p>Funding provided for program development and testing</p> <p>FY 2018 Plans: Funding supports live fire test and evaluation, initial operational test and evaluation and production qualification testing of the Joint Assault Bridge (JAB).</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY18 is the final year of RDT&E funding for the Joint Assault Bridge (JAB) program. JAB RDT&E efforts were funded under 654804.H02 for FY17 and prior.</p>	-	12.200	-	-	-
<p>Title: Mobile Armored Combat Earthmover (MACE)</p> <p>Description: The Mobile Armored Combat Earthmover (MACE) will replace the M9 Armored Combat Earthmover and will be primarily a mobility asset, enabling maneuver units during attacks and movements to</p>	-	-	1.484	-	1.484

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) EW8 / <i>Armored Engineer Vehicles</i>

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
contact. The MACE will provide hasty survivability and counter-mobility capabilities to the maneuver units until more survivability and counter-mobility assets can move forward to support the maneuver force's defenses. It will operate with primarily medium and heavy mechanized forces but will be capable of supporting all combat forces and the full range of military operations.					
Funding provided for program development and testing					
<i>FY 2019 Base Plans:</i> Funding supports Whole Systems Trades Analysis Tool (WSTAT) analyses by the TACOM Cost & Systems Analysis Group and supporting organizations. The WSTAT output will be an input to the follow-on formal Analysis of Alternatives study to be conducted by the Army Capabilities Integration Center.					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> FY19 is the first year of funding for the Mobile Armored Combat Earthmover (MACE) program.					
Accomplishments/Planned Programs Subtotals	-	12.200	1.484	-	1.484

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

Line Item	FY 2017	FY 2018	FY 2019	FY 2019	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	Cost To	
			Base	OCO	Total					Complete	Total Cost
• GZ3001: <i>Joint Assault Bridge</i>	64.752	128.350	142.255	-	142.255	205.772	226.964	290.954	248.729	Continuing	Continuing

Remarks

D. Acquisition Strategy

Funding will support RDT&E efforts to support testing and follow-on production for Assault Bridging.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603804A / Logistics and Engineer Equipment Adv Dev				EW8 / Armored Engineer Vehicles							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Support	MIPR	Various : Various	-	-		0.600	Nov 2017	0.150	Nov 2018	-		0.150	Continuing	Continuing	Continuing
Subtotal			-	-		0.600		0.150		-		0.150	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
MACE Whole Systems Trades Analysis Tool (WSTAT)	C/FFP	TBD : TBD	-	-		-		1.334	Jan 2019	-		1.334	0.000	1.334	-
Subtotal			-	-		-		1.334		-		1.334	0.000	1.334	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Initial Operational Test & Evaluation (IOTE)	MIPR	Operational Test Command : Ft. Hood, TX	-	-		6.693	Mar 2018	-		-		-	0.000	6.693	-
Developmental Testing & Operational Testing (DT / OT)	MIPR	Aberdeen Proving Grounds : MD	-	-		0.407	Jan 2018	-		-		-	0.000	0.407	-
Production Qualification Testing (PQT)	MIPR	Aberdeen Proving Grounds : MD	-	-		4.500	Nov 2017	-		-		-	0.000	4.500	-
Subtotal			-	-		11.600		-		-		-	0.000	11.600	N/A
Project Cost Totals			-	-		12.200		1.484		-		1.484	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) EW8 / <i>Armored Engineer Vehicles</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Joint Assault Bridge Development & Testing																												
Life Fire Test & Eval																												
Production Qualification Test																												
Developmental Test / Operational Test																												
Initial Operational Test & Eval																												
Full Rate Production																												
Mobile Armored Combat Earthmover (MACE)																												
MACE - Whole System Trades Analysis Tool (WSTAT)																												
MACE - Materiel Development Decision (MDD)																												
MACE - Market Survey																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) EW8 / <i>Armored Engineer Vehicles</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Joint Assault Bridge Development & Testing	1	2016	1	2019
Life Fire Test & Eval Armor Development	1	2016	4	2016
Life Fire Test & Eval	4	2016	4	2018
Production Qualification Test	4	2017	2	2018
Developmental Test / Operational Test	2	2018	2	2018
Initial Operational Test & Eval	3	2018	3	2018
Full Rate Production	1	2019	1	2019
Mobile Armored Combat Earthmover (MACE)	1	2018	4	2026
MACE - Whole System Trades Analysis Tool (WSTAT)	2	2018	4	2018
MACE - Materiel Development Decision (MDD)	1	2019	4	2019
MACE - Market Survey	1	2020	2	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>					Project (Number/Name) G11 / <i>Adv Elec Energy Con Ad</i>		
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
G11: <i>Adv Elec Energy Con Ad</i>	-	5.051	6.524	3.335	-	3.335	3.372	7.201	7.405	17.413	0.000	50.301
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Management and Distribution Control (MDC) was previously named Improved Power Distribution Illumination Systems Electrical (IPDISE).

A. Mission Description and Budget Item Justification

The Tactical Electric Power (TEP) program was established by the Department of Defense to develop modernized, standard families of mobile electric power sources and power distribution systems for all Services throughout the Department of Defense. Project Manager Expeditionary Energy & Sustainment Systems (PM E2S2) matures and integrates technology that will improve the next generation of tactical power sources in support of all Services. It supports initiatives that are essential to the development and fielding of modernized TEP sources from Watts to Megawatts level that will extend Army operational mission reach and duration through the improvements to efficiency, reliability, maintainability, and interoperability in support of the Army Operating Concept and Multi-Domain Battle. FY19 funding will support test and evaluation of technologies in support of Small Tactical Electric Power (STEP), Management and Distribution Control (MDC), and Command Post Infrastructure Integration (CPI2). Technologies include hybrid power systems, open architecture tactical microgrids, command post infrastructure, and validated methods to prove out suitability and effectiveness. Funding also supports the Joint Operational Energy Initiative (JOEI), a holistic Modeling and Simulation approach to the evaluation of Operational Energy (OE)-related theater-wide impacts of systems and improvements with the vision of reducing Army energy dependency and demand. Program costs include developing concept hardware and executing system evaluations at Army demonstration events and exercises (AEWE, AWA, etc.)

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Contract Activity	2.351	3.524	-	-	-
Description: Continue maturation and integration of technology supporting the STEP and MDC programs.					
FY 2018 Plans: Develop various technologies related to TEP and power distribution/management across the DoD power spectrum. Specific efforts will include demo of metering and monitoring systems, energy storage and inverter systems, and MDC. Develop tools, systems and capability to provide holistic M&S analysis of Operational Energy, and support customer/stakeholder analysis to inform key Science and Technology (S&T), Acquisition, and Requirements Development decision making.					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) G11 / <i>Adv Elec Energy Con Ad</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Due to affordability issues funding in FY19 was moved to other RDTE efforts. Efforts in support of the STEP program such developing demonstration of metering and monitoring systems, energy storage and inverter systems, and support of MDC programs will be delayed until FY20.					
<p>Title: Government System Test and Evaluation</p> <p>Description: Supports in house and external performance tests of concept hardware. Also supports evaluation of systems at Network Integration Evaluation (NIE).</p> <p>FY 2018 Plans: Continue evaluation and testing of various technologies related to tactical electric power and power distribution and management across the DoD power spectrum. Efforts will be aimed at resolving technology gaps to meet Army User requirements. Efforts will support the TEP CPD. Specific efforts will include performance testing of hybrid/alternative energy power sources, open standards grid communications, and intelligent power distribution/management systems. Program supports new equipment and concept demonstrations at NIE 18.2.</p> <p>FY 2019 Base Plans: Continue evaluation and testing of various technologies related to tactical electric power and power distribution and management across the DoD power spectrum. Efforts will be aimed at resolving technology gaps to meet Army User requirements. Efforts will support the TEP CPD. Specific efforts will include performance testing of hybrid energy power sources.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Due to affordability issues funding was reduced in FY19 in order to support other higher priority RDTE efforts.</p>	0.400	0.400	0.200	-	0.200
<p>Title: Other Contracts and Government agencies</p> <p>Description: Matrix engineering and analysis support for continued development of technology supporting the STEP program, MDC, and CPI2, as well as analysis and data management.</p> <p>FY 2018 Plans: Continue evaluation and testing of various technologies related to tactical electric power and power distribution and management across the DoD power spectrum. Efforts will be aimed at resolving technology gaps to meet Army User requirements. Efforts will support the TEP CPD. Specific efforts will include contract management and testing of hybrid/ alternative energy power sources and power distribution/management systems. Program supports new equipment and concept demonstrations at NIE 17.2. Includes oversight, analysis and management</p>	1.000	1.300	1.500	-	1.500

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) G11 / <i>Adv Elec Energy Con Ad</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
of Operational Energy-related impacts, systems and improvements to reduce Army's energy dependence and improve operational capabilities.					
FY 2019 Base Plans: Continue evaluation and testing of various technologies related to tactical electric power and power distribution and management across the DoD power spectrum. Efforts will be aimed at resolving technology gaps to meet Army User requirements. Efforts will support the TEP CPD. Specific efforts will include contract management and testing of hybrid/ alternative energy power sources and power distribution/management systems. Program supports new equipment and concept demonstrations at NIE 19.2. Includes oversight, analysis and management of Operational Energy-related impacts, systems and improvements to reduce Army's energy dependence and improve operational capabilities.					
FY 2018 to FY 2019 Increase/Decrease Statement: FY19 is higher than FY18 as increased matrix inter-service support will be required to cover analysis that will shape and inform requirements for hybrid and micro-grid architectures. These efforts will feed the MDC and STEP programs by establishing a clear alignment between user demands and technology capabilities.					
Title: Government Program Management					
Description: Continue development of technology supporting the STEP program, MDC and CPI2.					
FY 2018 Plans: Oversight and management of various technology projects related to Tactical Electric Power and power distribution/management across the DoD power spectrum. Efforts will be aimed at resolving technology gaps to meet Army User requirements. Efforts will support the TEP Capabilities Production Document (CPD). Specific efforts will include support of MEHPS, and power MDC systems. Oversight, analysis and management of Operational Energy-related impacts, systems and improvements to reduce Army's energy dependence and improve operational capabilities.					
FY 2019 Base Plans: Oversight and management of various technology projects related to Tactical Electric Power and power distribution/management across the DoD power spectrum. Efforts will be aimed at resolving technology gaps to meet Army User requirements. Efforts will support the CPI2 Capabilities Development Document (CDD). Specific efforts will include support of CPI2, and power MDC systems. Oversight, analysis and management					
	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
	1.300	1.300	1.635	-	1.635

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) G11 / <i>Adv Elec Energy Con Ad</i>

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
of Operational Energy-related impacts, systems and improvements to reduce Army's energy dependence and improve operational capabilities.					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> FY19 includes additional management support and expected with ramp-up of the CPI2 program compared to FY18. Intelligent power integration into the system will require greater inter-office engagement and coordination.					
Accomplishments/Planned Programs Subtotals	5.051	6.524	3.335	-	3.335

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• 194: <i>Engine Driven Gen Ed</i>	6.599	12.890	1.803	-	1.803	5.095	15.485	14.475	14.163	0.000	70.510
• MA9800: <i>Generators And Associated Equip</i>	132.391	116.204	133.772	0.569	134.341	113.476	88.765	115.703	101.957	0.000	802.837

Remarks

D. Acquisition Strategy

Complete advanced development pre-milestone B technology assessments and analysis, and transition products to Engineering and Manufacturing Development (EMD) phase (Milestone B) and subsequent transition to production (Milestone C). Support concept development and demonstration efforts. Products and technologies supported include tactical power and energy sources, alternative/renewable energy systems, power distribution components, and power management and distribution control systems. Perform analysis of Operational Energy related impacts to future development programs to better direct RDECOM efforts.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603804A / Logistics and Engineer Equipment Adv Dev				G11 / Adv Elec Energy Con Ad							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Platoon Power Generation	MIPR	PM E2S2 : Ft. Belvoir, VA	-	-		0.200		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	PM E2S2 : Fort Belvoir, VA	0.733	-		0.200		0.175		-		0.175	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	PM E2S2 : Ft. Belvoir, VA	0.432	0.164		0.200		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	PM E2S2 : Ft. Belvoir, VA	0.935	0.573		0.303		0.250		-		0.250	Continuing	Continuing	Continuing
Operational Energy	MIPR	PM E2S2 : Fort Belvoir, VA	1.200	0.328		0.400		0.150		-		0.150	Continuing	Continuing	Continuing
Subtotal			3.300	1.065		1.303		0.575		-		0.575	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	-	-		0.750		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	Various	CERDEC : Fort Belvoir, VA	3.281	-		0.750		0.750		-		0.750	Continuing	Continuing	Continuing
Hybrid Power Sources Components	Various	Multiple Vendors : TBD	2.165	0.205		0.250		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	Various	CERDEC : Fort Belvoir, VA	3.034	1.692		0.621		0.700		-		0.700	Continuing	Continuing	Continuing
Operational Energy	TBD	TBD : TBD (FY15)	2.000	0.409		0.500		0.249		-		0.249	Continuing	Continuing	Continuing
Metering and Monitoring Demo	Various	TBD : TBD	-	0.205		0.250		-		-		-	Continuing	Continuing	Continuing
Subtotal			10.480	2.511		3.121		1.699		-		1.699	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603804A / Logistics and Engineer Equipment Adv Dev				G11 / Adv Elec Energy Con Ad							
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	-	-		0.400		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	1.706	-		0.300		0.385		-		0.385	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	1.229	0.492		0.200		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Control Systems	MIPR	CERDEC : Fort Belvoir, VA	1.258	0.492		0.300		0.376		-		0.376	Continuing	Continuing	Continuing
Operational Energy	MIPR	Dept of Energy Sandia National Labs : Washington DC	1.500	0.163		0.200		0.100		-		0.100	Continuing	Continuing	Continuing
Subtotal			5.693	1.147		1.400		0.861		-		0.861	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Platoon Power Generation (PPG)	MIPR	CERDEC : Fort Belvoir, VA	-	-		0.250		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	1.130	-		0.200		0.200		-		0.200	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	0.665	0.164		-		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	CERDEC : Fort Belvoir, VA	1.597	0.164		0.250		-		-		-	Continuing	Continuing	Continuing
Subtotal			3.392	0.328		0.700		0.200		-		0.200	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018					
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>				Project (Number/Name) G11 / <i>Adv Elec Energy Con Ad</i>						
	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	22.865	5.051		6.524		3.335		-		3.335	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) G11 / <i>Adv Elec Energy Con Ad</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM																												
Assess Technologies to Meet Gaps-STEP																												
Test Technologies to Meet Gaps-STEP																												
Transfer to Engineering and Manufacturing Development-STEP																												
Management and Distribution Control (MDC)																												
Assess Technologies to Meet Gaps-MDC																												
Test Technologies to Meet Gaps-MDC																												
Test Ruggedized MDC concepts with AMMPS Microgrid																												
Transfer to Engineering and Manufacturing Development-MDC Phase 3																												
ASSESSMENT OF TECHNOLOGIES																												
Assess Technologies to Meet Gaps and Improve Efficiencies																												
OPERATIONAL ENERGY (OE)																												
Evaluation of OE-Related Impacts, Systems and Improvements																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) G11 / <i>Adv Elec Energy Con Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM	1	2016	2	2021
Assess Technologies to Meet Gaps-STEP	1	2016	2	2021
Test Technologies to Meet Gaps-STEP	1	2016	2	2021
Transfer to Engineering and Manufacturing Development-STEP	2	2021	2	2021
Management and Distribution Control (MDC)	1	2016	4	2022
Assess Technologies to Meet Gaps-MDC	1	2016	4	2018
Test Technologies to Meet Gaps-MDC	1	2020	3	2020
Test Ruggedized MDC concepts with AMMPS Microgrid	1	2016	1	2017
Transfer to Engineering and Manufacturing Development-MDC Phase 3	4	2020	4	2020
ASSESSMENT OF TECHNOLOGIES	1	2017	4	2022
Assess Technologies to Meet Gaps and Improve Efficiencies	1	2017	4	2022
OPERATIONAL ENERGY (OE)	1	2016	4	2019
Evaluation of OE-Related Impacts, Systems and Improvements	1	2016	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603804A / Logistics and Engineer Equipment Adv Dev				Project (Number/Name) K39 / Field Sustainment Support Ad			
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
K39: Field Sustainment Support Ad	-	2.528	2.429	2.311	-	2.311	1.675	1.720	1.773	1.807	0.000	14.243
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports development of critical cargo aerial delivery capabilities. These systems will fill identified theater distribution and services capability gaps, improve unit sustainability, and increase combat effectiveness. This project supports Advanced Component Development and Prototyping of Critical Distribution Capabilities which provide improved safety and accuracy while increasing survivability of aircraft, personnel, and equipment. This project develops critical enablers that support the Army in executing future movement and maneuver operations and distributed sustainment support by maintaining readiness through fielding and integrating new equipment. This project also ensures Army Expeditionary Forces are capable of rapid deployment through aerial delivery initiatives and reduces sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands in lift, combat zone footprint, and costs for logistical support.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Joint Precision Airdrop System-2K Block 1 Upgrade (JPADS-BLK1)	2.128	-	-	-	-
Description: Supports increasing the technological and design maturity, testing, and integration of several key initiatives focused on: maintaining system accuracy and reliability in Global Positioning System (GPS) denied environments; collision avoidance; more precise position determination software; and improved Guidance Navigation and Control (GN&C) hardware.					
Title: Rapid Rigging and DeRigging Airdrop System (RRDAS) Phase I	-	1.918	1.277	-	1.277
Description: Reduces rigging times while also providing the capability to rapidly de-rig loads on the drop zone. This will reduce the lead time to prepare Low Velocity Airdrop System (LVADS) loads while also increasing the survivability of receiving ground forces by ensuring the airdrop loads (to include weapon systems, prime movers, trailers, etc.) are quickly de-rigged and made operational. RRDAS is a three phase Research, Development, Testing and Engineering (RDT&E) effort, Phase I will focus on loads up to 20,000 pounds and platform lengths up to 20 feet and will include prime movers such as HMMWV.					
FY 2018 Plans: Complete Milestone B package. Initiate and conduct Design Validation (DV) testing.					
FY 2019 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) K39 / <i>Field Sustainment Support Ad</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Complete component evaluation in realistic airdrop environment and transition to Engineering and Manufacturing Development (EMD). FY 2018 to FY 2019 Increase/Decrease Statement: Funds are decreasing from FY 18 to FY 19 as program is moving from technology integration and prototype development to system evaluation.					
Title: Advanced Low Velocity Airdrop System (ALVADS) - Light and Heavy/ Dual Row Airdrop System (DRAS) Application FY 2018 Plans: Conduct DRAS Design Validation (DV) prototype testing to establish ALVADS DRAS configuration. FY 2019 Base Plans: Conduct evaluation of established ALVADS DRAS configuration in a realistic operational environment. Transition to EMD. FY 2018 to FY 2019 Increase/Decrease Statement: Values are increased to fund for additional Dual Row Airdrop System (DRAS) integrated flight testing in FY 19.	0.400	0.511	1.034	-	1.034
Accomplishments/Planned Programs Subtotals	2.528	2.429	2.311	-	2.311

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• MA7806: <i>Precision Airdrop</i>	4.298	4.147	3.751	1.980	5.731	3.788	2.079	2.140	2.184	0.000	24.367
• L39: <i>Field Sustainment Support Ed</i>	3.569	3.147	2.223	-	2.223	2.974	3.052	3.146	3.247	0.000	21.358

D. Acquisition Strategy
Conduct pre Engineering and Manufacturing Development (EMD) advanced component development to reduce risk prior to entering EMD phase.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603804A / Logistics and Engineer Equipment Adv Dev				K39 / Field Sustainment Support Ad							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Project Management Support	Various	PMFSS : Natick, MA	6.282	0.328	Oct 2016	0.400		0.279		-		0.279	Continuing	Continuing	Continuing
SBIR+STTR	TBD	Various : Various	0.090	-		-		-		-		-	0.000	0.090	-
Subtotal			6.372	0.328		0.400		0.279		-		0.279	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Extracted High and Low Speed Container Delivery System (EHLSCDS)	Various	Various : Various	1.861	-		-		-		-		-	Continuing	Continuing	Continuing
ALVADS-L/H DRAS	Various	Various : Various	-	0.500	Mar 2017	0.484		-		-		-	Continuing	Continuing	Continuing
JPADS Block 1 upgrade	Various	Various : Various	15.934	0.500	Nov 2016	-		-		-		-	Continuing	Continuing	Continuing
Rapid Rigging/Derigging	Various	Various : Various	-	-		0.495		0.250		-		0.250	0.000	0.745	-
Advanced Low Velocity Airdrop System-L/H	Various	Various : Various	1.300	-		-		0.295		-		0.295	0.000	1.595	-
Subtotal			19.095	1.000		0.979		0.545		-		0.545	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
JPADS Block 1 upgrade	Various	Various : Various	0.060	0.050	Nov 2016	-		-		-		-	0.000	0.110	-
ALVADS-L/H DRAS	Various	Various : Various	-	0.050	Mar 2017	0.300		-		-		-	0.000	0.350	-
Rapid Riggind/DeRigging	Various	Various : Various	-	-		0.200		-		-		-	0.000	0.200	-
Subtotal			0.060	0.100		0.500		-		-		-	0.000	0.660	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) K39 / <i>Field Sustainment Support Ad</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Conduct RRDAS Phase I market research and acquire prototype components																												
Conduct RRDAS Phase I component development/integration																												
JPADS Block I upgrade component development and risk reduction																												
JPADS 10K Block upgrade component development																												
Assure resupply Low Cost Precision market research and acquire prototypes																												
Conduct ALVADS/DRAS feasibility study																												
Conduct ALVADS/DRAS baseline evaluations																												
Conduct ALVADS/DRAS prototype flight tests																												
RRDAS Phase 2 upgrade component development																												
RRDAS Phase 3 upgrade component development																												
Evaluate Integrated RRDAS technology																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) K39 / <i>Field Sustainment Support Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Conduct RRDAS Phase I market research and acquire prototype components	2	2018	3	2018
Conduct RRDAS Phase I component development/integration	3	2018	4	2018
JPADS Block I upgrade component development and risk reduction	1	2017	4	2017
JPADS 10K Block upgrade component development	2	2020	2	2021
Assure resupply Low Cost Precision market research and acquire prototypes	2	2021	2	2022
Conduct ALVADS/DRAS feasibility study	3	2017	1	2019
Conduct ALVADS/DRAS baseline evaluations	2	2018	3	2018
Conduct ALVADS/DRAS prototype flight tests	3	2018	4	2019
RRDAS Phase 2 upgrade component development	4	2021	2	2023
RRDAS Phase 3 upgrade component development	4	2022	2	2024
Evaluate Integrated RRDAS technology	1	2019	2	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>			Project (Number/Name) K41 / <i>Water And Petroleum Distribution - Ad</i>				
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
K41: <i>Water And Petroleum Distribution - Ad</i>	-	2.237	4.773	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.010
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates the potential of prototype equipment and technologies to satisfy petroleum storage, distribution, and quality surveillance system requirements. The Technology Development programs support the development and enhancement of rapidly deployable Petroleum and Water equipment. The mission includes developing fuel quality analysis systems; achieving greater capabilities in the removal of Nuclear, Biological, Chemical (NBC) and other contaminants from water sources; reducing the logistics footprint; alternative source water acquisition, reutilization and disposal systems to reduce the requirement for transport of water into the theater; water purification and waste water treatment and material systems to decrease the logistics footprint and employment time for the transfer of liquid logistics in joint operations area. This vital equipment enables the Army to achieve its mission by providing the Army with the means to be highly mobile and self-sustaining in very hostile joint operations areas. Future Force operations demand that combat systems be rapidly deployable to the theater, rapidly emplaced upon arrival, and rapidly relocated to support a fast moving non-linear battlefield.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: 3K Tactical Water Purification System (3K TWPS)	0.273	1.788	-	-	-
FY 2018 Plans: INTENTIONALLY LEFT BLANK					
FY 2018 to FY 2019 Increase/Decrease Statement: Funding has decreased to zero.					
Title: Early Entry Fluid Distribution System (E2FDS)	1.964	2.985	-	-	-
Description: The Early Entry Fluid Distribution System (E2FDS) is a rapidly emplaced, high-throughput petroleum distribution conduit system. The E2FDS consists of 5-mile systems that can be connected to each other to form a pipeline trace up to 50 miles long. It can throughput 850,000 gallons of petroleum or 650,000 gallons of raw/non-potable water per day. E2FDS is emplacement at a rate of 25 miles per day and retrieved at a rate of 10 miles per day. The components are configured in stackable International Standards Organization (ISO) twenty foot equivalent units (TEU) for deployment and is Heavy Expanded Mobility Tactical Truck-Load Handling System (HEMTT-LHS), Palletized Load System (PLS) and PLS Trailer transportable. It includes a Command and Control Module (C2M) that allows for central control of the pipeline trace from a single location.					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) K41 / <i>Water And Petroleum Distribution - Ad</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
The E2FDS complements the Inland Petroleum Distribution System (IPDS) by adding an early entry capability as well as a means for rapidly extending existing pipeline.					
FY 2018 Plans: INTENTIONALLY LEFT BLANK					
FY 2018 to FY 2019 Increase/Decrease Statement: Funding has decreased to zero.					
Accomplishments/Planned Programs Subtotals	2.237	4.773	-	-	-

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
• L41: <i>Water And Petroleum Distribution - Ed</i>	6.541	8.005	10.774	-	10.774	8.885	8.944	9.046	9.404	0.000	61.599
• MA6000: <i>Distribution Systems, Petroleum & Water</i>	113.896	47.597	39.730	-	39.730	44.631	42.570	34.655	29.374	0.000	352.453
• R67500: <i>PETROLEUM QUALITY ANALYSIS SYSTEM</i>	8.207	6.903	1.770	-	1.770	-	-	-	-	0.000	16.880

Remarks

D. Acquisition Strategy
Develop engineering prototypes for the 3K Tactical Water Purification System (3K TWPS), Army Fuels Automated Management System (AFAMS), and select Non-Development Item (NDI) based on market surveys and proposals from industry. Based on market research a decision to award a competitive or sole source contract. E2FDS will conduct Developmental Testing (DT) and will test data to inform a fair opportunity decision for production. Army Fuels Automated Management System (AFAMS) sensors will require the development and testing of self-reporting sensors for all fuel storage tanks.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603804A / Logistics and Engineer Equipment Adv Dev				K41 / Water And Petroleum Distribution - Ad							
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
3K Tactical Water Purification System (3K TWPS)	Various	TARDEC : Warren, MI	1.030	-		1.788		-		-		-	0.000	2.818	Continuing
Early Entry Fluid Distribution System (E2FDS)	C/FFP	DRS : West Plains, IL	5.888	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			6.918	-		1.788		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Early Entry Fluid Distribution System (E2FDS)	MIPR	TARDEC & PM, PAWS : Warren, MI	1.183	1.964	Feb 2017	-		-		-		-	0.000	3.147	Continuing
3K TWPS	MIPR	TARDEC : Warren, MI	-	0.273	Mar 2017	-		-		-		-	0.000	0.273	-
Subtotal			1.183	2.237		-		-		-		-	0.000	3.420	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Modular Fuel System (MFS)	MIPR	Yuma Proving Ground : Yuma, AZ	0.750	-		-		-		-		-	0.000	0.750	Continuing
3K Tactical Water Purification System (3K TWPS)	MIPR	TARDEC : Warren, MI	1.312	-		-		-		-		-	0.000	1.312	Continuing
Early Entry Fluid Distribution System (E2FDS)	MIPR	Aberdeen Proving Ground : APG, MD	-	-		2.985		-		-		-	0.000	2.985	-
Subtotal			2.062	-		2.985		-		-		-	0.000	5.047	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>				Project (Number/Name) K41 / <i>Water And Petroleum Distribution - Ad</i>				
	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	10.163	2.237	4.773	-	-	-	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) K41 / <i>Water And Petroleum Distribution - Ad</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				
	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	
3K Tactical Water Purification System (3K TWPS)																													
3K TWPS Milestone B																													1 MS B
3K TWPS Preliminary Design Review																													4 PDR
3K TWPS CDR																													6 CDR
3K TWPS Developmental Testing																													DT
3K TWPS Milestone C																													7 MS C
3K TWPS Production Qualification Testing / Operational Testing																													PQT/IOT
Early Entry Fluid Distribution System (E2FDS)																													
E2FDS Preliminary Design Review																													2 PDR
E2FDS Critical Design Review																													3 CDR
E2FDS Developmental Testing																													DT
E2FDS Milestone C																													5 MS C
E2FDS First Article Test / Initial Operational Testing																													FAT/IOT

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) K41 / <i>Water And Petroleum Distribution - Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
3K Tactical Water Purification System (3K TWPS)	4	2016	2	2022
3K TWPS Milestone B	2	2018	2	2018
3K TWPS Preliminary Design Review	1	2019	1	2019
3K TWPS CDR	1	2020	1	2020
3K TWPS Developmental Testing	3	2019	4	2019
3K TWPS Milestone C	3	2020	3	2020
3K TWPS Production Qualification Testing / Operational Testing	3	2021	3	2022
Early Entry Fluid Distribution System (E2FDS)	1	2016	4	2020
E2FDS Preliminary Design Review	2	2018	2	2018
E2FDS Critical Design Review	4	2018	4	2018
E2FDS Developmental Testing	1	2019	3	2019
E2FDS Milestone C	4	2019	4	2019
E2FDS First Article Test / Initial Operational Testing	1	2021	3	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>				Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>			
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
VR8: <i>Combat Service Support Systems - Ad</i>	-	4.004	5.062	3.222	-	3.222	3.447	3.116	2.587	2.637	0.000	24.075
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports Advanced Component Development and Prototyping of critical soldier support and sustainment systems that provide more endurance and agility to combat operations enabling success of Army Expeditionary Forces in future multi-domain scenarios. Project includes shelter systems (rigid and soft wall), expeditionary base camp subsystems, field service systems, mortuary affairs equipment, field heaters, and other combat service support equipment. These systems will fill identified theater capability gaps, improve unit sustainability, improve resource and energy efficiency and increase combat effectiveness. This project supports Advanced Component Development and Prototyping of critical tactical support systems that support mobile Joint Service command and control, medical, and maintenance platforms. This project develops critical enablers that support the Army Campaign Plan and Army Modernization Strategy by maintaining readiness through fielding and integrating new equipment.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Resource and Energy Efficiency Enabling Solutions	1.063	2.128	1.516	-	1.516
Description: Reduces the resource, operational energy and logistics footprint of critical soldier support and sustainment systems while maintaining or improving operational effectiveness. The goal is to significantly reduce fuel, water, and power requirements to sustain multi-domain operations in addition to reducing maintenance and spare parts requirements. Systems such as Command Posts, Expeditionary Operating Bases, and Combat Support Hospitals require a significant amount of logistics and sustainment support which cost valuable resources, require extra human effort (that means a risk in the form of Soldiers on the road), limit endurance, restrict agility, and increase vulnerability.					
FY 2018 Plans: Conduct evaluation of integrated technologies that are transitioning from the RDECOM 6.3 programs in a realistic operational environment at the Ft Devens Base Camp Integration Laboratory (BCIL). Efforts are focused on proving out subsystem maturity and the potential of these technologies before transitioning into Engineering and Manufacturing Development (EMD) and putting them into operational use within the Army Force Provider base camps as Pre-Planned Product Improvements (P31). Focus will be on evaluating technologies that will improve upon the environmental, resource, and energy efficiency performance of the base camp. Specifically, evaluate technologies in the areas of: resource and energy efficiency; renewable energy collection and storage;					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>and smart base camp monitoring transitioning from the RDECOM 6.3 programs. Prepare promising technologies for transition into EMD supporting Force Provider requirements and OSD Joint Expeditionary Basing Work Group initiatives.</p> <p>FY 2019 Base Plans: Conduct evaluation of integrated technologies that are transitioning from the RDECOM 6.3 programs in a realistic operational environment utilizing the Base Camp Integration Laboratory (BCIL). Focus efforts on technologies that will make the greatest impact on reducing resource and operational energy demands of current and developing critical enabling soldier support and sustainment platforms that support multi-domain operations to include integrated Command Posts and expeditionary sustainment systems. Identify promising alternative energy sources, renewable energy collection and storage capabilities for integration and conduct evaluations. Collect data from evaluations to inform and support Decision Points for transition into EMD.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decrease in funding due to the fact that there were numerous efforts transitioned into EMD at the end of FY18. FY19 funding supports two main efforts: reducing resource and operational energy demands within integrated Command Posts and expeditionary sustainment systems and renewable energy collection/storage evaluation.</p>					
<p>Title: Black Waste Elimination for Small Base Camps (150 personnel)</p> <p>Description: Provides the capability to reduce/eliminate the black water generated by small base camps. The objective capability will reduce our sustainment requirements for backhauling black waste water as well as our risk of contaminating the environment with biological contaminants. This capability will significantly reduce reliance on external support and is a key capability required to reduce sustainment requirements.</p> <p>FY 2018 Plans: Award contract to fabricate an integrated prototype that incorporates promising black waste elimination technologies that are transitioning from the RDECOM 6.3 program for evaluation in a realistic operating environment at the Ft Devens Base Camp Integration Laboratory (BCIL).</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decrease in funding due to completion of effort in FY18 with Decision Point after evaluation of integrated prototypes at the Ft Devens Base Camp Integration Laboratory (BCIL).</p>	0.075	0.700	-	-	-
<p>Title: Solid Waste Disposal for Small Base Camps</p>	1.613	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: Provides an integrated waste management (reduction, treatment or disposal process) add-on capability that can safely process 1,000 lbs or more of mixed solid waste in a single day on site. Mixed solid waste produced on a single 150 person site must be properly managed through reduction, reuse, recycling, treatment, or disposal. Most of the waste is nonhazardous solid waste. Provides a substantial improvement over the current practice of burn pits that poses a health risk to Soldiers and/or the backhaul logistics burden.</p>					
<p>Title: Ultralightweight Camouflage Net System (ULCANS)</p> <p>Description: ULCANS is durable, robust, snag resistant state of the art camouflage system that provides increased survivability against multi-spectral visual, infrared and radar threats, thermal signature suppression and significant thermal/solar reduction capability. ULCANS utilizes a snag-free design and is capable of use in all types of weather and climatic conditions except in heavy snow and winds. ULCANS variants are integrated systems that are very lightweight, easily deployable, versatile, user friendly and tailored to the equipment meeting the requirements of operations for combat systems, command and control equipment, logistic support sites, tactical facilities, and fixed facilities. RDT&E funding supports formal development of new ULCANS variants (Arctic, Urban) and necessary technology/signature enhancements for current ULCANS variants (Woodland and Desert).</p>	0.250	-	-	-	-
<p>Title: Expeditionary Waste to Energy System</p> <p>Description: The Expeditionary Waste to Energy System reduces the operational energy and logistics footprint of the expeditionary base camp system, with the goal of providing an integrated waste management and disposal process add-on capability that can safely process up to two tons of mixed solid organic waste in a single day on site with the energy associated with the management process being converted to usable energy in the form of fuel, heat and/or electric power. This capability will provide a safe and suitable means to dispose of waste in remote expeditionary base camps while reducing the fuel and power requirements to sustain operations in the field. This capability provides a substantial improvement over the current practice of burn pits and backhaul with associated vulnerabilities and safety issues.</p> <p>FY 2018 Plans: Complete technology assessment of integrated capabilities to determine suitability and technology maturity. Based upon assessment results, make down selection to suitable technology for further evaluation in a realistic environment.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p>	0.553	0.650	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Planned transition to EMD suspended in light of other priorities and pending future technology maturation.					
<p>Title: Army Standard Family of Soft Wall Shelters (ASF-SWS)</p> <p>Description: The ASF-SWS program will conduct formal development to incorporate the latest technologies into a fully supportable and modernized family. The intent is to eliminate the proliferation of non-standard shelters and their associated logistics burden, thereby reducing the lifecycle cost of SWS across the Services. The program will produce approved Technical Data Packages (TDPs) to support procurements by materiel developers and Program Managers (PMs) requiring SWS. ASF-SWS procurements are customer funded by PMs as a cost under their program(s).</p> <p>FY 2019 Base Plans: Conduct Materiel Development Decision. Procure prototypes that integrate emerging technologies and conduct an evaluation and demonstration of these integrated SWS technologies in a realistic environment. Initial focus on Mission Command variants.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Increase in funding due to ASF-SWS program start in FY19 and requirement to support an extensive series of evaluations on multiple ASF-SWS variants.</p>	-	-	0.891	-	0.891
<p>Title: Army Standard Family of Rigid Wall Shelters (ASF-RWS)</p> <p>Description: The ASF-RWS program will conduct formal development to incorporate the latest technologies into a fully supportable and modernized family. The intent is to eliminate the proliferation of non-standard shelters and their associated logistics burden, thereby reducing the lifecycle cost of RWS across the Services. The program will produce approved Technical Data Packages (TDPs) to support procurements by materiel developers and Program Managers (PMs) requiring RWS. ASF-RWS procurements are customer funded by PMs as a cost under their program(s). The ASF-RWS will consist of three variants: (1) Expandable/Non-Expandable; (2) Vehicle Mounted; and (3) Panelized/Collapsible with a focus on the following features and improvements: reduced cost, reduced weight, improved energy efficiency, improved corrosion resistance, and improved transportability.</p> <p>FY 2018 Plans:</p>	0.450	1.584	0.815	-	0.815

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Evaluate integrated technologies transitioning from RDECOM and Industry. Complete performance specification, solicitation, and release solicitation for ASF-RWS Family of Expandable/Non-Expandable ISO RWS Variants development contract. Conduct Milestone B and transition variant to EMD.					
<i>FY 2019 Base Plans:</i> Evaluate integrated technologies from industry and RDECOM to prove out subsystem maturity prior to transition into EMD for the Vehicle Mounted ASF-RWS variants. Complete market investigation, prepare and release solicitation to support development contract for the Vehicle Mounted ASF-RWS variants.					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Effort supports advance component development of multiple variants of the ASF(RWS). Funding decrease due to the transition of the Expandable/ Non-Expandable RWS variant into EMD at the end of FY18. FY19 effort reduced with focus on the Vehicle Mounted variants only.					
Accomplishments/Planned Programs Subtotals	4.004	5.062	3.222	-	3.222

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• VR7: <i>Combat Service Support Systems</i>	4.159	3.743	4.533	-	4.533	6.132	4.819	5.271	3.064	0.000	31.721

Remarks

D. Acquisition Strategy

Evaluate Integrated Technologies in a realistic operational environment and transition promising efforts into Engineering and Manufacturing Development (EMD). Accelerate efficiency, standardization, and safety initiatives to incorporate in deployed systems, develop new Technical Data Packages (TDP), and/or incorporate during reset of equipment.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support	Various	PM FSS : Natick, MA	1.235	0.612	Oct 2016	0.457		0.365	Nov 2018	-		0.365	Continuing	Continuing	-
SBIR+STTR	TBD	various : Various	0.062	-		-		-		-		-	0.000	0.062	-
Subtotal			1.297	0.612		0.457		0.365		-		0.365	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Soldier Support Equipment	Various	Various : Various	5.571	2.486	Jan 2017	3.750		-		-		-	Continuing	Continuing	-
Energy Efficiency Enabling Solutions	Various	Various : Various	-	0.191		-		0.681	Jan 2019	-		0.681	0.000	0.872	-
Army Standard Family of Soft Wall Shelters (ASF-SWS)	Various	Various : Various	-	-		-		0.746	Mar 2019	-		0.746	0.000	0.746	-
Army Standard Family of Rigid Wall Shelters (ASF-RWS)	Various	Various : Various	-	-		-		0.295	Dec 2018	-		0.295	0.000	0.295	-
Subtotal			5.571	2.677		3.750		1.722		-		1.722	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Soldier Support Equipment	Various	Various : Various	4.795	-		0.855		-		-		-	Continuing	Continuing	-
Energy Efficiency Enabling Solutions	Various	Various : Various	-	0.715		-		0.585	Feb 2019	-		0.585	0.000	1.300	-
Army Standard Family of Soft Wall Shelters (ASF-SWS)	Various	Various : Various	-	-		-		0.100	Mar 2019	-		0.100	0.000	0.100	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Conduct evaluation on resource & energy efficiency enabling solu																												
Conduct evaluation and demonstration of Black Waste Elimination																												
Evaluate Solid waste Disposal Technologies for small base camp																												
Conduct demonstration of ULCANS technology enhancements																												
Conduct technology assessment on Waste to Energy capabilities																												
Evaluate integrated ASF-RWS technologies for all variants																												
Prepare for and conduct ASF-RWS Materiel Development Decision (MDD)																												
Prepare for Milestone B and transition ASF-RWS (Exp/Non-Exp) to EMD																												
Prepare for Milestone B and transition ASF-RWS (Veh Mtd) to EMD																												
Prepare for Milestone B and transition ASF-RWS (Coll/Panel) to EMD																												
Evaluate integrated ASF-SWS technologies for all variants																												
Prepare for and conduct ASF-SWS MDD																												
Prepare for Milestone B and transition ASF-SWS (Mission Cmd) to EMD																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023																							
	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																				
Prepare for Milestone B and transition ASF-SWS (General Purpose) to EMD																																																
Evaluate integrated advanced Mortuary Affairs technologies																																																
Prepare for and conduct advanced Mortuary Affairs MDD																																																
Prepare for Milestone B and transition advanced Mortuary Affairs to EMD																																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A / <i>Logistics and Engineer Equipment Adv Dev</i>	Project (Number/Name) VR8 / <i>Combat Service Support Systems - Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Conduct evaluation on resource & energy efficiency enabling solutions	1	2016	4	2023
Conduct evaluation and demonstration of Black Waste Elimination technologies	1	2016	4	2018
Evaluate Solid waste Disposal Technologies for small base camps	1	2017	4	2017
Conduct demonstration of ULCANS technology enhancements	1	2016	4	2017
Conduct technology assessment on Waste to Energy capabilities	1	2016	4	2018
Evaluate integrated ASF-RWS technologies for all variants	1	2016	4	2020
Prepare for and conduct ASF-RWS Materiel Development Decision (MDD)	3	2017	1	2018
Prepare for Milestone B and transition ASF-RWS (Exp/Non-Exp) to EMD	1	2018	2	2018
Prepare for Milestone B and transition ASF-RWS (Veh Mtd) to EMD	3	2019	4	2019
Prepare for Milestone B and transition ASF-RWS (Coll/Panel) to EMD	3	2020	1	2021
Evaluate integrated ASF-SWS technologies for all variants	3	2019	4	2021
Prepare for and conduct ASF-SWS MDD	1	2019	3	2019
Prepare for Milestone B and transition ASF-SWS (Mission Cmd) to EMD	3	2019	2	2020
Prepare for Milestone B and transition ASF-SWS (General Purpose) to EMD	3	2021	2	2022
Evaluate integrated advanced Mortuary Affairs technologies	3	2022	4	2023
Prepare for and conduct advanced Mortuary Affairs MDD	3	2022	1	2023
Prepare for Milestone B and transition advanced Mortuary Affairs to EMD	3	2023	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>
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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	-	47.336	33.491	34.284	-	34.284	39.477	40.475	43.169	35.353	0.000	273.585
808: <i>DoD Drug & Vacc Ad</i>	-	14.382	14.372	14.004	-	14.004	16.125	16.548	16.948	17.372	0.000	109.751
811: <i>Mil HIV Vac&Drug Dev</i>	-	4.120	5.230	5.296	-	5.296	5.460	5.603	5.973	1.110	0.000	32.792
836: <i>Field Medical Systems Advanced Development</i>	-	17.334	13.604	14.691	-	14.691	17.599	18.022	19.937	16.871	0.000	118.058
CS4: <i>MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)</i>	-	7.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.500
FF4: <i>Counterdrug, DDR, Sys Development & Demonstration</i>	-	4.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.000
VST: <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>	-	0.000	0.285	0.293	-	0.293	0.293	0.302	0.311	0.000	0.000	1.484

A. Mission Description and Budget Item Justification

This Program Element (PE) funds development of medical materiel within the early system integration portion of the System Development and Demonstration phase of the acquisition life cycle using 6.4 (Advanced Component Development and Prototype) funding. Program efforts support transition of promising Science and Technology candidate medical technologies (drugs, vaccines, medical devices, diagnostics, and mechanisms for detection and control of disease carrying insects) to larger scale testing in humans for safety and effectiveness. Programs are aligned to meet future force requirements identified within concept documents and organizational structures. This PE also provides funding for Food and Drug Administration (FDA) regulated human clinical trials to gain additional information about safety and effectiveness on the path to licensure for use in humans.

The Projects supported by this PE are:

Project 808 funds development of candidate medical countermeasures for infectious diseases of military relevance. Efforts include vaccines, drugs, diagnostic kits/ devices, and insect control measures. These funds support human clinical efficacy trials of the drug/vaccine in a larger group that are designed to assess performance and to continue safety assessments in a larger group of volunteers. Products from this Project will transition to PE 0604807A/Project 849.

Project 811 funds the development of military relevant human immunodeficiency virus (HIV) medical countermeasures. It provides funding for planning and conducting of human clinical trials in a group of healthy volunteers to assess the drug/vaccine for safety, tolerability, how the drug/vaccine is distributed, metabolized, and excreted from the body, and investigate the appropriate dose for therapeutic use. Products from this Project will transition to PE 0604807A/Project 812.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>
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Project 836 funds the demonstration and validation of medical products for enhanced combat casualty care and follow-on care, including rehabilitation. This project also funds the human clinical trials that test the safety and effectiveness of biologics, devices and demonstration. Clinical trials are conducted in accordance with United States (U.S.) FDA regulations. Products from this project will transition to PE 0604807A/Project 832.

Project VS7 funds program upgrades, retrofits, trains, and sustains the fleet of Medical Evacuation legacy helicopters that continue to play a major role in Iraq and Afghanistan. The approved force design increased the number of air frames in the force from 12 to 15 aircraft for 37 medical evacuation (MEDEVAC) companies. All products from this Project will transition to PE 0604807A/Project VS8.

Project CS4 funds congressionally special interest in:Transport Telemedicine - Initiate Joint Advanced Technology Demonstration to provide Medical Treatment Facility (MTF) automatic situational awareness system to identify patients en-route to MTFs and automate paramedic tasks.

These Projects are managed by U.S. Army Medical Materiel Development Activity (USAMMDA) and U.S. Army Medical Materiel Agency (USAMMA) of the U.S. Army Medical Research and Materiel Command.

Project FF4 funded Secretary of Defense approved counterdrug advanced development efforts used in a major re-design of the Forensic Toxicology Drug Testing Laboratory (FTDTL) information management system used to test urine samples for the presence of illegal drugs. The Drug Testing Program - Client Collection System (DTP-CSS) is comprised of several variations of a desktop application used to select service members for random drug testing, prepare labels for urine specimen bottles, and print corresponding chain-of-custody documents. This Project will standardize DTP-CSS across all services and migrate it to a Web-based system.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	33.503	33.491	35.572	-	35.572
Current President's Budget	47.336	33.491	34.284	-	34.284
Total Adjustments	13.833	0.000	-1.288	-	-1.288
• Congressional General Reductions	-0.015	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	7.500	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	3.506	-			
• SBIR/STTR Transfer	-1.158	-			
• Adjustments to Budget Years	-	-	-1.288	-	-1.288
• OSD Directed Transfer	4.000	-	-	-	-

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: CS4: *MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)*

FY 2017	FY 2018

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)

Congressional Add: *Congressional Special Interest_ Transport Telemedicine*

Congressional Add Subtotals for Project: CS4

Congressional Add Totals for all Projects

	FY 2017	FY 2018
	7.500	-
	7.500	-
	7.500	-

Change Summary Explanation

In Fiscal Year 2017 there was a Congressional Add of \$7.5 Million for Medical Systems Advanced Development Initiatives, an Office of the Secretary of Defense (OSD)-directed \$4.0 Million transfer to Project FF4, counterdrug DVR System Development and Demonstration, and there was a reprogramming action of \$3.506 Million from 0604807A/812 to 0603807A/811 for HIV Vaccine Development.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>				Project (Number/Name) 808 / <i>DoD Drug & Vacc Ad</i>			
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
808: <i>DoD Drug & Vacc Ad</i>	-	14.382	14.372	14.004	-	14.004	16.125	16.548	16.948	17.372	0.000	109.751
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds development of candidate medical countermeasures for infectious diseases of military relevance. These efforts are in: vaccines, drugs, diagnostic kits/devices, and to determine if insects are infected with pathogenic organisms capable of infecting service members/preventive medicine measures. These funds support human clinical effectiveness (capacity to produce a desired size of an effect under ideal or optimal conditions) trials of the drug/vaccine in larger groups that are designed to assess how well the drug/vaccine works, and to continue safety assessments in a larger group of volunteers. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of medical diagnostic kits and devices. This work, which is performed in military laboratories or civilian pharmaceutical firms, is directed toward the prevention of disease, early diagnosis, and accelerated recovery time once diagnosed; to enhance battlefield readiness. All clinical trials are conducted in accordance with United States (U.S.) Food and Drug Administration (FDA) regulations, a mandatory obligation for all military products placed into the hands of medical providers or service members. Product development priorities are determined based upon four major factors: (1) the extent and threat of the disease within the Combatant Commands theater of operations, (2) the clinical severity of the disease, (3) the technical maturity of the proposed solution, and (4) the affordability of the solution (development and production).

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

	FY 2017	FY 2018	FY 2019
Title: DoD Drug and Vaccine Advanced Development	14.382	14.372	14.004
Description: Funding is provided for the following effort in the development of candidate medical countermeasures for military relevant infectious disease.			
FY 2018 Plans: Dengue Vaccine Block II: Will continue clinical development of the dengue human infection model, a tool used to evaluate and down select candidates transitioning from science and technology (S&T). Treatment for Resistant Wound Infections: Conduct safety and effectiveness clinical study. Next Generation Malaria Prophylaxis: Will continue the retinal (eye) safety study (3 year study) started in FY16. Will prepare the protocols for the required soldier specific studies needed for the FDA review. Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (Multiple)): Will continue field testing and evaluation of several diagnostic product candidates to include: dengue, chikungunya and bacterial diarrhea.			
FY 2019 Plans: Dengue Vaccine Block II: Will continue the clinical development of the dengue human infection model (DHIM), a tool for rapid evaluation of efficacy of dengue vaccines and therapeutics. Treatment for Resistant Wound Infections: Will monitor technical maturity of candidate treatments for evidence of safety and efficacy in relevant animal models. Proposed solutions could be stand-alone treatments or adjuncts to established medical practice. Candidate treatments could be small-molecule drugs, biologicals			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 808 / <i>DoD Drug & Vacc Ad</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
such as bacteriophages, or antibodies. Next Generation Malaria Prophylaxis: Will continue the retinal (eye) safety study (3 year study) started in FY17. Address any FDA post-marketing approval requirements. Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (Multiple)): The dengue and chikungunya assays will continue to be developed and evaluated. Clinical testing will be conducted for dengue and clinical sites identified for chikungunya.			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Decrease in funding of \$19 dollars in FY19 was due to price adjustments.			
Accomplishments/Planned Programs Subtotals	14.382	14.372	14.004

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

Remarks

D. Acquisition Strategy
Test and evaluate in-house and commercially developed products in extensive government-managed clinical trials to gather data required for FDA licensure and Environmental Protection Agency registration.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems Advanced Development	Project (Number/Name) 808 / DoD Drug & Vacc Ad
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Management Services Cost	Various	Not Applicable : Not applicable	19.535	2.030		2.520		2.511		-		2.511	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	PO	General Dynamics Information Technology, : Frederick MD	2.493	2.086		2.454		2.322		-		2.322	0.000	9.355	-
Subtotal			22.028	4.116		4.974		4.833		-		4.833	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Cost	Various	Not applicable : Not applicable	28.430	2.036		2.803		-		-		-	Continuing	Continuing	Continuing
Rapid Diagnostic and Detection Devices	C/Various	Inbios, Inc : Seattle WA	-	-		-		2.051		-		2.051	0.000	2.051	-
Subtotal			28.430	2.036		2.803		2.051		-		2.051	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Support Cost	Various	Not Applicable : Not applicable	13.194	2.527		-		1.220		-		1.220	Continuing	Continuing	Continuing
Subtotal			13.194	2.527		-		1.220		-		1.220	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 808 / <i>DoD Drug & Vacc Ad</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Topical Antileishmanial Cream Expanded Access Treatment Pg	[Redacted]				[Redacted]																							
Dengue Vaccine Block II Human Infection model studies	[Redacted]				[Redacted]				[Redacted]																			
Treatment for Resistant Wound Infections Phase 2 safety trial	[Redacted]				[Redacted]				[Redacted]																			
D5P Next Generation Malaria Drug Clinical Studies	[Redacted]				[Redacted]																							
Rapid Human Diagnostic Devices	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 808 / <i>DoD Drug & Vacc Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Topical Antileishmanial Cream Expanded Access Treatment Pgm	2	2011	1	2017
Dengue Vaccine Block II Human Infection model studies	1	2016	4	2019
Treatment for Resistant Wound Infections Phase 2 safety trial	1	2016	4	2019
D5P Next Generation Malaria Drug Clinical Studies	1	2016	4	2017
Rapid Human Diagnostic Devices	4	2017	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>				Project (Number/Name) 811 / <i>Mil HIV Vac&Drug Dev</i>			
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
811: <i>Mil HIV Vac&Drug Dev</i>	-	4.120	5.230	5.296	-	5.296	5.460	5.603	5.973	1.110	0.000	32.792
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project funds development of militarily relevant human immunodeficiency virus (HIV) medical countermeasures. It provides for the planning and conduct of human clinical trials in a group of healthy volunteers to assess for safety and tolerability of medical countermeasures, how the drug/vaccine is distributed through, metabolized in, and excreted from the body, and to investigate the appropriate dose. Development efforts are focused on militarily unique needs affecting manning, mobilization, and deployment. The cumulative cost of treating HIV-positive DoD personnel is estimated to be \$16.6 billion for 3000 personnel over a 50-year lifetime. All clinical trials are conducted in accordance with U.S. FDA regulations.

Research efforts are coordinated with the National Institutes of Health and the National Institute of Allergy and Infectious Diseases (NIAID), Division of Acquired Immune Deficiency Syndrome (DAIDS).

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

	FY 2017	FY 2018	FY 2019
Title: Military HIV Vaccine & Drug Development	4.120	5.230	5.296
Description: This Project funds advanced development research to develop candidate HIV vaccines, assess their safety and effectiveness in evaluations with human subjects, and protect military personnel from risks associated with HIV infection.			
FY 2018 Plans: Regional Vaccine Candidate: Completing execution of cohort study in high risk population in Thailand in preparation for start of clinical trial to Phase IIb/III effectiveness testing (testing to determine safety and performance) of vaccine regimen. Global Vaccine Candidate: Developing human safety study test plan for new HIV vaccine components. Initiating regulatory and scientific reviews of human safety study test plan. Preparing clinical safety study sites in Africa to execute the study of the global vaccine. Global vaccine has moved up in priority because it meets the manufacturing capability requirement and can meet the Capability Development Document threshold in one step as opposed to incrementally.			
FY 2019 Plans: New components of the regional vaccine will be tested in FY19. This testing will determine if improved effectiveness can be achieved. This study will be conducted in three regions, and is supported by the U.S. Army and DAIDS. The cohort studies in Thailand and Germany will be completed in FY19, with results available by the end of the FY. Selection of clinical sites for future effectiveness studies will be initiated.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 811 / <i>Mil HIV Vac&Drug Dev</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
The minor increase of funding in FY 19 was due to inflation factor.			
Accomplishments/Planned Programs Subtotals	4.120	5.230	5.296

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

N/A

Remarks

D. Acquisition Strategy

Test and evaluate commercially developed drug/vaccine candidates in government-managed trials.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems Advanced Development	Project (Number/Name) 811 / Mil HIV Vac&Drug Dev
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Management Services Cost	TBD	Not Applicable : Not Applicable	3.161	0.119		0.852		-		-		-	Continuing	Continuing	Continuing
Subtotal			3.161	0.119		0.852		-		-		-	Continuing	Continuing	N/A

Remarks
Not Applicable

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Cost	TBD	Not applicable : Not applicable	3.797	0.284		0.997		-		-		-	Continuing	Continuing	Continuing
Subtotal			3.797	0.284		0.997		-		-		-	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Support Cost	TBD	TBD : TBD	2.282	0.157		1.112		-		-		-	0.000	3.551	-
Subtotal			2.282	0.157		1.112		-		-		-	0.000	3.551	N/A

Remarks
Not Applicable

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 811 / <i>Mil HIV Vac&Drug Dev</i>
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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development T&E Cost	TBD	Not applicable : Not Applicable	19.978	3.560		2.269		5.296		-		5.296	0.000	31.103	-
Subtotal			19.978	3.560		2.269		5.296		-		5.296	0.000	31.103	N/A

Remarks
Not Applicable

	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	29.218	4.120	5.230	5.296	-	5.296	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 811 / <i>Mil HIV Vac&Drug Dev</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
RV305A Amendment to add open-label boost to volunteers	[Red bar]				[Red bar]																							
	FY 15-FY17																											
RV306 Intensive Immune Monitoring of Prime-Boost Vaccine	[Red bar]				[Red bar]																							
	FY 12-FY15																											
RV328 Intensive Immune Monitoring of AIDSVAXB/E alone	[Red bar]				[Red bar]																							
	FY 12-FY18																											
RV Candidate Cohort development for efficacy studies	[Red bar]				[Red bar]																							
	FY 16-FY18																											
RV Candidate Immune Characterization for protective immunity	[Red bar]				[Red bar]				[Red bar]				[Red bar]				[Red bar]				[Red bar]							
	[Red bar]				[Red bar]				FY 19-FY22																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 811 / <i>Mil HIV Vac&Drug Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RV305A Amendment to add open-label boost to volunteers	3	2015	2	2017
RV306 Intensive Immune Monitoring of Prime-Boost Vaccine	2	2011	4	2017
RV328 Intensive Immune Monitoring of AIDSVAXB/E alone	4	2014	1	2018
RV403 to evaluate adjuvant's ability to enhance durability	2	2015	3	2015
RV Candidate Cohort development for efficacy studies	4	2016	4	2018
RV Candidate Immune Characterization for protective immunity	1	2019	2	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>				Project (Number/Name) 836 / <i>Field Medical Systems Advanced Development</i>			
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
836: <i>Field Medical Systems Advanced Development</i>	-	17.334	13.604	14.691	-	14.691	17.599	18.022	19.937	16.871	0.000	118.058
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds the demonstration and validation of medical products for enhanced combat casualty care and follow-on care, including rehabilitation. This Project funds human clinical trials to test the safety and effectiveness of biologics (products derived from living organisms) and devices necessary to meet medical requirements. When available, commercial-off-the-shelf (COTS) medical products are also tested and evaluated for transition to engineering and manufacturing development. Consideration is also given to reducing the medical logistics footprint through smaller weight, volume, and equipment independence from supporting materials. All clinical trials are conducted in accordance with U.S. FDA regulations.

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

	FY 2017	FY 2018	FY 2019
Title: Field Medical Systems Advanced Development - Program Management (PM) Medical Devices	14.463	10.848	8.349
Description: Advanced Concept Development funding is provided for the following development of medical devices in support of enhanced combat casualty care.			
FY 2018 Plans: Compartment Syndrome Pressure Device: This Project transitioned to Defense Health Program funding in FY17.			
Junctional / Noncompressible Hemorrhage Control Agent: Developmental efforts will be completed and available for procurement. Intrathoracic Pressure Regulation Therapy (IPRT): Perform operational and suitability testing. Achieve Milestone B. Field Anesthesia: Performing a pivotal clinical trial on the device and working to finalize the design for production and obtain FDA clearance/approval. Ocular Drug Delivery (Ocular Salvage Device): Starting clinical trials. Complete Milestone A and finalize the capability development document. Portable Extracorporeal Membrane Oxidation (ECMO) device: Conduct clinical validation of prototype device. Work towards Milestone B accomplishment. Non-invasive neuro assessment device (NINAD): Product will transition to Advanced Development in FY18. Prepare for FDA submission and initiate clinical trials.			
FY 2019 Plans: Field Anesthesia: Will continue clinical trials and prototype comparison. Temporary Corneal Repair (TCR): Continue down select activities.			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 836 / <i>Field Medical Systems Advanced Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Portable ECMO: Will continue clinical trials and device refinement. NINAD: Will continue FDA clinical trial for the indication for use of diagnosing mild traumatic brain injury.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding decrease was due to a shift in priorities from PM Devices to other PMs to fund higher priority efforts.</p>				
<p>Title: Field Medical Systems Advanced Development - PM Medical Support Systems</p> <p>Description: Funding is provided for the following effort in the development of products that support the medical mission in combat casualty care and health care operations.</p> <p>FY 2018 Plans: Next Generation Uniform Repellent/Impregnation: Transitioning to PE 0604807A/Project 832. Litter Transport Shock/Stressor Mitigation System (Formally: NGIS): Transitioning to PE 0604807A/Project 832. Remote Triage Sensor System: Transitioning to PE 0604807A/Project 832. Nett Warrior Enhanced Physiological Sensors (Wearable): Collaborating with Program Executive Office (PEO) Soldier on the development of wearable physiological sensors.</p> <p>FY 2019 Plans: Nett Warrior Enhanced Wearable Sensors: Will continue to collaborate with Program Executive Office Soldier on the development of wearable sensors. Semi-autonomous casualty evacuation (CASEVAC) Ground Platform (S-MET): Will collaborate with PEO Combat Systems & Combat Support Systems on the Ground Mobility Vehicle Infantry Squad Variant (GMVISV).</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: The increase of funding in FY19 is due to the planned progression of medical products under development, in collaboration with other PEOs.</p>		2.871	2.494	2.656
<p>Title: Field Medical Systems Advanced Development - PM Tissue Injury and Regenerative Medicine</p> <p>Description: Funding for engineering and manufacturing development of tissue injury and regenerative medicine health products for enhanced medical capability and readiness</p> <p>FY 2018 Plans: Fracture Putty: Transition ?Fracture Putty? scaffold product from Science & Technology. Supporting Fracture Putty?s scale-up development, validation, and required FDA regulatory activities to achieve a commercial product.</p> <p>FY 2019 Plans:</p>		-	0.262	2.365

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 836 / <i>Field Medical Systems Advanced Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Topical Burn Conversion Prevention Product: Will submit an Investigational Device Exemption, and will prepare for safety and effectiveness trials for a product to prevent superficial burn wounds from developing into deep partial and full thickness burn injuries.</p> <p>Systemic Burn Conversion Prevention Product: Will initiate manufacturing of material and Phase 2 clinical trial (safety and effectiveness) for a product used as an intravenous treatment in burn injuries.</p> <p>Permanent Acellular Arterial Graft: Will initiate manufacturing of material and a Phase 2 (safety and efficacy) clinical trial to support vascular grafting for extremity repair and reconstruction.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> The increase of funding in FY19 is due to the planned progression of two burn medical products in development.</p>				
<p><i>Title:</i> Field Medical Systems Advanced Development - PM Pharmaceutical Systems</p> <p><i>Description:</i> Funding is provided for engineering and manufacturing development of medical products managed by Program Manager (PM) Pharmaceuticals for enhanced combat casualty care and follow-on care, including rehabilitation.</p> <p><i>FY 2019 Plans:</i> Cold Stored Platelets in Platelet Additive Solution: Will complete studies for product characterization and labeling information and effectiveness.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Increase is due to blood related product studies scheduled in FY19.</p>		-	-	1.321
Accomplishments/Planned Programs Subtotals		17.334	13.604	14.691
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Develop in-house or industrial prototypes in government-managed programs to meet military and regulatory requirements for production and fielding.				
E. Performance Metrics				
N/A				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems Advanced Development	Project (Number/Name) 836 / Field Medical Systems Advanced Development
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Management Services Cost	Various	Not Applicable : Not applicable	41.811	3.124		1.009		0.974		-		0.974	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	C/IDIQ	Not applicable : Not applicable	-	1.200		-		1.185		-		1.185	0.000	2.385	-
Subtotal			41.811	4.324		1.009		2.159		-		2.159	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Product Development	TBD	TBD : TBD	0.932	-		-		-		-		-	0.000	0.932	-
Medical Product Development	TBD	ALL Product : Various	1.931	1.083		0.850		2.368		-		2.368	Continuing	Continuing	Continuing
Product Development of Freeze-dried plasma	TBD	TBD : TBD	8.778	-		-		-		-		-	Continuing	Continuing	Continuing
Point of Care Coagulation Profiler	TBD	TBD : TBD	0.385	-		-		-		-		-	0.000	0.385	-
TBI Diagnostic Assay System - Increment II (benchtop/POC/ Bandits)	TBD	Banyan BioMarkers, Inc : Alachua FL	13.231	2.583		-		-		-		-	0.000	15.814	-
Impedance Threshold Device for the Treatment of Traumatic Brain Injury	TBD	Advance Circulatory Systems Inc. : Roseville, MN	2.322	-		0.626		-		-		-	0.000	2.948	-
Compartment Syndrome Pressure Device	TBD	Twinstar : Minniapolis, MN	1.871	-		-		-		-		-	0.000	1.871	-
Hydration Status Monitor	TBD	Gaia Medical : LaJolla CA	0.841	-		-		-		-		-	0.000	0.841	-
Noninvasive Neuromodulator TBI	TBD	TBD : TBD	2.036	-		2.298		-		-		-	0.000	4.334	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems Advanced Development	Project (Number/Name) 836 / Field Medical Systems Advanced Development
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
PTSD	Various	TBD : Various locations	-	2.032		2.300		-		-		-	0.000	4.332	-
Ocular Salvage Device	Various	TBD : TBD	-	2.479		2.461		-		-		-	0.000	4.940	-
Field Anesthesia	TBD	TBD : Various	-	2.568		3.262		1.120		-		1.120	0.000	6.950	-
Field Sterilizer	TBD	TBD : TBD	3.515	-		-		3.221		-		3.221	0.000	6.736	-
Product Development	TBD	HemCon Medical Technologies : Tigard, Oregon	9.720	-		-		-		-		-	Continuing	Continuing	Continuing
Product Development	TBD	Banyan BioMarkers, Inc : Alachua FL	31.514	-		-		-		-		-	Continuing	Continuing	Continuing
Development of Platelet Derived Hemostatic agent	TBD	Fast Track Drugs & Biologics : Frederick, MD	1.800	-		-		-		-		-	Continuing	Continuing	Continuing
Non-invasive neuro assessment device (NINAD)	C/Various	TBD : TBD	-	0.800		-		3.074		-		3.074	0.000	3.874	-
Advanced Refrigerated Platelet Storage Technology	C/Various	TBD : TBD	-	-		-		0.985		-		0.985	0.000	0.985	-
Subtotal			78.876	11.545		11.797		10.768		-		10.768	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Support Cost	Various	Not Applicable : Not applicable	45.720	0.744		0.548		1.152		-		1.152	Continuing	Continuing	Continuing
Subtotal			45.720	0.744		0.548		1.152		-		1.152	Continuing	Continuing	N/A

Remarks
No product/contract costs greater than \$1M individually.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 836 / <i>Field Medical Systems Advanced Development</i>
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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development T&E Cost	TBD	Not applicable : Not applicable	37.693	0.721		0.250		0.612		-		0.612	Continuing	Continuing	Continuing
Subtotal			37.693	0.721		0.250		0.612		-		0.612	Continuing	Continuing	N/A

Remarks
No product/contract costs greater than \$1M individually.

	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	204.100	17.334	13.604	14.691	-	14.691	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 836 / <i>Field Medical Systems Advanced Development</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
Temporary Corneal Repair	[Redacted]																															
	R&D development																															
Noninvasive Neuro Assessment Device development	[Redacted]																															
	R&D development																															
Intrathoracic Pressure Regulation Therapy	[Redacted]																															
	R&D development																															
Field Anesthesia	[Redacted]																															
					R&D development																											
Cold Stored Platelets in Platelet Additive solution	[Redacted]																															
					R&D Development																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) 836 / <i>Field Medical Systems Advanced Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Temporary Corneal Repair	2	2016	1	2021
Noninvasive Neuro Assessment Device development	1	2016	1	2023
Intrathoracic Pressure Regulation Therapy	4	2015	1	2023
Field Anesthesia	4	2017	3	2022
Cold Stored Platelets in Platelet Additive solution	4	2017	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) CS4 / <i>MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)</i>
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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
CS4: <i>MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)</i>	-	7.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.500
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for medical systems advanced development initiatives in Transport Telemedicine - Initiate Joint Advanced Technology Demonstration for MEDHUB to provide Medical Treatment Facility (MTF) automatic situational awareness system to identify patients en-route to MTFs and automate paramedic tasks.

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

	FY 2017	FY 2018
<i>Congressional Add:</i> Congressional Special Interest_ Transport Telemedicine	7.500	-
<i>FY 2017 Accomplishments:</i> N/A		
Congressional Adds Subtotals	7.500	-

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>		Project (Number/Name) CS4 / <i>MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Telemedicine product development (MEDHUB) - Develop MEDHUB Prototype																												
Telemedicine product development (MEDHUB) - Peripheral Integration																												
Telemedicine product development (MEDHUB) - Software Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) CS4 / <i>MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Telemedicine product development (MEDHUB) - Develop MEDHUB Prototype	2	2018	1	2019
Telemedicine product development (MEDHUB) - Peripheral Integration	1	2018	1	2019
Telemedicine product development (MEDHUB) - Software Development	1	2018	1	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>			Project (Number/Name) FF4 / <i>Counterdrug, DDR, Sys Development & Demonstration</i>				
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
FF4: <i>Counterdrug, DDR, Sys Development & Demonstration</i>	-	4.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Supports the Secretary of Defense approved counterdrug advanced development efforts used in a major re-design of the Forensic Toxicology Drug Testing Laboratory (FTDTL) information management system used to test urine samples for the presence of illegal drugs. The Drug Testing Program - Client Collection System (DTP-CSS) is comprised of several variations of a desktop application used to select service members for random drug testing, prepare labels for urine specimen bottles, and print corresponding chain-of-custody documents. This Project will standardize DTP-CSS across all services and migrate it to a Web-based system.

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

	FY 2017	FY 2018	FY 2019
Title: Development and demonstration of tracking laboratory urine samples used in drug testing	4.000	-	-
Accomplishments/Planned Programs Subtotals	4.000	-	-

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>		Project (Number/Name) FF4 / <i>Counterdrug, DDR, Sys Development & Demonstration</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023																							
	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																				
Determine Hosting requirements	<div style="position: absolute; top: 10px; left: 10px;">1</div>																																															
Coding and Development Testing																																																
User Testing																																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) FF4 / <i>Counterdrug, DDR, Sys Development & Demonstration</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Determine Hosting requirements	2	2017	2	2017
Coding and Development Testing	3	2017	1	2019
User Testing	1	2019	2	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>				Project (Number/Name) VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>			
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
<i>VS7: MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>	-	0.000	0.285	0.293	-	0.293	0.293	0.302	0.311	0.000	0.000	1.484
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Medical Evacuation Enroute Care Validation Study is completed in Fiscal Year (FY) 2015. Products from this project transition to Program element (PE) 0604807A/ Project VS8 in FY 16.

A. Mission Description and Budget Item Justification

Original models of Army Black Hawk Medical Evacuation (MEDEVAC) helicopters continue to play a major role in maintaining high U.S. troop survival rates in Iraq and Afghanistan by evacuating wounded troops in less than one-hour. In 2009 a Vice Chief of Staff, Army (VCSA)-approved force design update increased the number of air frames in the force from 12 to 15 aircraft for 37 MEDEVAC companies to better meet operational needs. In 2010, the U.S. Army Medical Department (AMEDD) accepted life-cycle management of the MEDEVAC Evacuation Package (MEP) from PEO Aviation. In order to achieve required operational capability and enhance commonality across the MEDEVAC fleet, the MEDEVAC MEP program upgrades, retrofits, trains, and sustains the 256 MEDEVAC legacy helicopters to achieve the medical capability provided by the HH-60M, which is factory built for the MEDEVAC mission.

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

	FY 2017	FY 2018	FY 2019
Title: Medical Evacuation Development	-	0.285	0.293
Description: This activity performs Aeromedical Evacuation Cabin and Technology Research to determine the optimum space and configuration for performing necessary life-saving paramedic-level tasks. Efforts will develop patient handling system components and prototypes to ensure paramedic skills and tasks are performed to standard to save Soldiers' lives during point of injury MEDEVAC Missions.			
FY 2018 Plans: Medical Evacuation Development: Aeromedical Evacuation Cabin and Technology Research is determining optimum space and configuration in order to perform necessary life-saving paramedic-level tasks. Developing patient handling system components and prototypes to ensure paramedic skills and tasks are performed to standard to save Soldiers' lives during point of injury MEDEVAC Missions.			
FY 2019 Plans: Future Vertical Lift (FVL) Aeromedical Evacuation Cabin Space and Technology Research and Design (Medical Evacuation Development): Determine optimum space and configuration to perform life-saving paramedic-level tasks in current and future			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
evacuation platforms. Will develop patient handling system components and prototypes to ensure paramedic skills and tasks are performed to standard to save Soldiers' lives during MEDEVAC Missions.				
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Increase in funding in FY19 is due to inflation factors.				
Accomplishments/Planned Programs Subtotals		-	0.285	0.293
C. Other Program Funding Summary (\$ in Millions) N/A				
Remarks				
D. Acquisition Strategy Develop in-house or industrial prototypes in government-managed programs to meet military MEDEVAC and regulatory requirements for production and fielding.				
E. Performance Metrics N/A				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems Advanced Development	Project (Number/Name) VS7 / MEDEVAC Mission Equipment Package (MEP) - Adv Dev
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Management Services Cost	TBD	APM MEDEVAC : Huntsville, AL	0.189	-		0.129		0.293		-		0.293	0.000	0.611	-
Subtotal			0.189	-		0.129		0.293		-		0.293	0.000	0.611	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Cost	TBD	APM MEDEVAC PEO Aviation : Huntsville AL	1.479	-		0.156		-		-		-	0.000	1.635	-
Subtotal			1.479	-		0.156		-		-		-	0.000	1.635	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development Support Cost	TBD	APM MEDEVAC : Huntsville, AL	0.911	-		-		-		-		-	0.000	0.911	-
Subtotal			0.911	-		-		-		-		-	0.000	0.911	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Medical Product Development T&E Cost	MIPR	APM MEDEVAC PEO Aviation : Huntsville, AL	0.199	-		-		-		-		-	0.000	0.199	-
Subtotal			0.199	-		-		-		-		-	0.000	0.199	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army								Date: February 2018			
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>				Project (Number/Name) VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>				
	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	2.778	-	0.285		0.293	-	0.293	0.000	3.356	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Telemedicine Research and Development and Data Transfer	Research and development																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / <i>Medical Systems Advanced Development</i>	Project (Number/Name) VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Telemedicine Research and Development and Data Transfer	1	2016	4	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>
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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	-	54.497	20.239	18.044	-	18.044	16.165	23.629	27.833	28.271	Continuing	Continuing
ET8: <i>Personnel Airdrop System Development</i>	-	0.664	0.495	0.396	-	0.396	0.297	1.267	1.265	1.813	Continuing	Continuing
S53: <i>Clothing And Equipment</i>	-	3.493	2.612	1.825	-	1.825	2.466	1.810	2.416	4.686	0.000	19.308
S54: <i>Small Arms Improvement</i>	-	11.649	6.851	7.687	-	7.687	10.566	16.108	19.243	15.284	0.000	87.388
VS4: <i>Soldier Protective Equipment</i>	-	38.691	10.281	8.136	-	8.136	2.836	4.444	4.909	6.488	0.000	75.785

A. Mission Description and Budget Item Justification

This Program Element (PE) for Advanced Component Development and Prototypes manages the Soldier as a system in order to increase combat effectiveness, test and deliver tangible products that save Soldier's lives, and improve Soldier's quality of life. It evaluates, develops, and tests emerging technologies and critical Soldier support systems to reduce technology risk.

Project ET8 funding (Personnel Airdrop System) supports efforts to improve Static Line (SL) and Military Free Fall (MFF) personnel parachutes and associated equipment to include canopy improvements based on integration of new technology with the goal of enhancing the insertion capability of the airborne soldier and increasing the performance, safety and durability of personnel airdrop equipment.

Project S53 funding (Clothing and Equipment) supports development of state-of-the-art technology to improve tactical and non-tactical clothing and individual equipment to enhance the lethality, survivability, and mobility of the individual Soldier.

Project S54 funding (Small Arms Improvement) provides funds to develop, demonstrate and evaluate emerging technology for integration of systems, subcomponents and prototypes designed to enhance lethality, target acquisition, fire control, training effectiveness and reliability for current and future small arms weapon systems and ammunition.

Project VS4 funding (Soldier Protective Equipment) supports efforts to evaluate integrated technologies and representative or prototype systems that help expedite Individual Soldier Ballistic Protection technology transition from the laboratory to operational use.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	31.120	20.239	20.846	-	20.846
Current President's Budget	54.497	20.239	18.044	-	18.044
Total Adjustments	23.377	0.000	-2.802	-	-2.802
• Congressional General Reductions	-0.014	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	24.500	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.109	-			
• Adjustments to Budget Years	-	-	-2.802	-	-2.802

Change Summary Explanation

The FY 2019 funding request was reduced by \$(2.491) million to account for the availability of prior year execution balances.
 FY 2017 increase: Delta attributable to congressional adds in the amounts of \$23M (Enhanced Lightweight body armor) and \$1.5M (Cannon life extension).

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>				Project (Number/Name) ET8 / <i>Personnel Airdrop System Development</i>			
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
ET8: <i>Personnel Airdrop System Development</i>	-	0.664	0.495	0.396	-	0.396	0.297	1.267	1.265	1.813	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding line established in FY17 for the Personnel Airdrop System Development. Efforts were previously executed in Program Element 0603827A S53.

A. Mission Description and Budget Item Justification

This funding supports efforts to improve Static Line (SL) and Military Free Fall (MFF) personnel parachutes and associated equipment to include canopy improvements based on integration of new technology with the goal of enhancing the insertion capability of the airborne Soldier and increasing the performance, safety and durability of personnel airdrop equipment. Includes integration and interface on the Soldier system.

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

	FY 2017	FY 2018	FY 2019
Title: Personnel Airdrop System Development	0.664	0.495	0.396
Description: Funding line is newly established in Fiscal Year (FY) 2017. Efforts were previously executed in Program Element 0603827A S53.			
FY 2018 Plans: Investigate and initiate T-11 improvements to address improved packability and weight reduction to include packing methods as agreed to during Army Airborne Board. Validate average oxygen consumption during high altitude / high opening assessment to verify future oxygen requirements prior to integration into the Parachutists Oxygen Delivery System (PODS). Procure PODS pre-breath prototype assets for evaluation.			
FY 2019 Plans: Continue to investigate and initiate T-11 improvements to address recommended T-11 changes in the static line parachute systems as agreed to during Army Airborne Board.			
FY 2018 to FY 2019 Increase/Decrease Statement: Funding decrease in Personnel Airdrop System Development portfolio is due to anticipated reduced requirements in FY18 and FY19.			
Accomplishments/Planned Programs Subtotals	0.664	0.495	0.396

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) ET8 / <i>Personnel Airdrop System Development</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• ES9: <i>RDTE 0604601A</i> <i>ES9 Advanced Tactical Parachute System</i>	2.858	5.840	7.200	-	7.200	6.694	1.851	3.000	3.000	0.000	30.443
• MA7801: <i>OPA MA7801 Advanced Tactical Parachute System</i>	16.611	28.440	41.610	-	41.610	48.819	60.280	54.264	45.000	0.000	295.024
• 0604601A: <i>INFANTRY SUPPORT WEAPONS</i>	63.842	-	83.155	-	83.155	82.105	96.663	76.241	64.575	0.000	466.581

Remarks

D. Acquisition Strategy

Programs pursue technology maturation and prototype development, culminating in the transition of mature technologies (Technology Readiness Level (TRL) 6-7) to Engineering and Manufacturing Development.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) ET8 / <i>Personnel Airdrop System Development</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Developmental Contracts	C/FFP	TBD : TBD	-	0.199		0.110		0.096		-		0.096	0.000	0.405	-
Engineering Support	MIPR	NSRDEC Natick, MA : various	-	0.090		0.100		0.100		-		0.100	0.000	0.290	-
Subtotal			-	0.289		0.210		0.196		-		0.196	0.000	0.695	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Program Management Support	Allot	PM SCIE : Belvoir	-	0.175		0.175		0.100		-		0.100	0.000	0.450	-
Subtotal			-	0.175		0.175		0.100		-		0.100	0.000	0.450	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Bench top testing	MIPR	TBD : TBD	-	0.200		0.110		0.100		-		0.100	0.000	0.410	-
Subtotal			-	0.200		0.110		0.100		-		0.100	0.000	0.410	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		-	0.664	0.495	0.396	-	0.396	0.000	1.555	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) ET8 / <i>Personnel Airdrop System Development</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Evaluate component and subsystem technologies	[Blue bar spanning FY 2017 to FY 2020]																											
Parachutists Oxygen Delivery System (PODS) MDD	[Pink shaded area from FY 2017 to FY 2018]																											
PODS Market Research	[Blue bar from FY 2019 Q2 to FY 2020 Q1]																											
PODS MS B	[Blue triangle '2' at FY 2019 Q4]																											
SL Canopy Release Assembly Testing	[Blue bar from FY 2023 Q1 to FY 2023 Q2]																											
Next Generation O2 Laboratory Testing	[Blue bar from FY 2023 Q1 to FY 2023 Q4]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) ET8 / <i>Personnel Airdrop System Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Evaluate component and subsystem technologies	1	2017	4	2020
Parachutists Oxygen Delivery System (PODS) MDD	1	2019	1	2019
PODS Market Research	2	2019	1	2020
PODS MS B	4	2019	4	2019
SL Canopy Release Assembly Testing	1	2023	4	2023
Next Generation O2 Laboratory Testing	1	2023	3	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>				Project (Number/Name) S53 / <i>Clothing And Equipment</i>			
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
S53: <i>Clothing And Equipment</i>	-	3.493	2.612	1.825	-	1.825	2.466	1.810	2.416	4.686	0.000	19.308
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding supports efforts to evaluate and integrate technologies and representative or prototype systems that help expedite Soldier uniform and clothing technology transition from the laboratory to operational use. Efforts focus on proving out commonality across as broad a spectrum of users as possible to provide a modular, integrated uniform/clothing system from skin out and head-to-toe. It funds efforts to investigate new technologies and domestically available fabrics with Flame Resistant (FR), moisture wicking, insect protection and camouflage technologies, including evaluation and integration of fabrics appropriate for uniforms and equipment used in jungle/tropical and arctic environments. New technologies are investigated to monitor health and improve Soldier survivability, reduce weight, and improve affordability, mobility and comfort in combat and training/administrative environments. Includes integration and interface on the Soldier system.

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

	FY 2017	FY 2018	FY 2019
Title: Soldier Uniforms and Clothing	2.680	2.042	1.419
Description: Develop and provide superior and sustainable integrated clothing for the Soldier in a rapidly changing global environment.			
FY 2018 Plans: Tactical Clothing. Conduct evaluation and integration of fabrics appropriate for uniforms and extremity protection used in arctic environment. Continue to evaluate and integrate technologies to support the development of accurate digital objective color assessment to provide pass/fail shade assessments for quality control and transition to Defense Logistics Agency Troop Support (DLA-TS). Evaluate improved lighter weight textiles which incorporate improved vector protection, Flame Resistant (FR) protection, and environmental protection while providing comfort, utility, and functionality. Evaluate next to skin uniform items using new no melt/no drip test methodology transitioning from Science and Technology (S&T) community. Continue evaluation of new technologies to mitigate spectral reflectance Short Wave Infrared (SWIR) for combat uniforms. Conduct evaluation and integration of insulated fabrics and technologies appropriate for handwear and footwear worn in extreme cold weather environments to be incorporated into hand and footwear systems transitioning from S&T community. Evaluate applicability of Flame/Heat Resistant thread technology transitioned from S&T for applicability in all FR uniforms.			
FY 2019 Plans: Will develop optimal jungle uniform materials and design technology transitioning from the Science and Technology (S&T) community to Product Manager Soldier Clothing and Individual Equipment (PdM SCIE) for use in jungle uniforms. Evaluate improved lighter weight textiles which incorporate improved vector protection, FR protection, and environmental protection while			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S53 / <i>Clothing And Equipment</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
providing comfort, utility, and functionality. Evaluate materials to support extreme cold temperature protection for military free fall parachutists. FY 2018 to FY 2019 Increase/Decrease Statement: Funding decrease in Soldier Uniforms and Clothing portfolio is due to anticipated reduced requirements in Fiscal Year (FY) 2018 and FY19.			
Title: Individual Equipment Description: Develop and provide superior and sustainable integrated individual equipment for the Soldier in a rapidly changing global environment. FY 2018 Plans: Continue evaluation of new technologies to mitigate spectral reflectance of Short Wave Infrared (SWIR) of nylon used in load carriage. FY 2019 Plans: Will evaluate government designed Modular Handgun System Holster transitioning from S&T community. FY 2018 to FY 2019 Increase/Decrease Statement: Funding decrease in Individual Equipment portfolio is due to anticipated reduced requirements in FY18 and FY19.	0.813	0.570	0.406
Accomplishments/Planned Programs Subtotals	3.493	2.612	1.825

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• S60: RDTE, 0604601A.S60, Clothing and Equipment	8.401	7.022	5.413	-	5.413	6.528	6.803	5.075	4.909	Continuing	Continuing

Remarks

D. Acquisition Strategy
Programs pursue technology maturation and prototype development, culminating in the transition of mature technologies (Technology Readiness Level (TRL) 6-7) to Engineering and Manufacturing Development. This project continues to exercise competitively awarded contracts using best value source selection procedures.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 4				PE 0603827A / Soldier Systems - Advanced Development				S53 / Clothing And Equipment								
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
Program Management Support	TBD	PM SPIE : Ft. Belvoir, VA	15.088	0.199		0.208		0.200		-		0.200	Continuing	Continuing	Continuing	
Subtotal			15.088	0.199		0.208		0.200		-		0.200	Continuing	Continuing	N/A	
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
Engineering Support	MIPR	NSRDEC : Natick, MA	15.428	0.500		0.410		0.300		-		0.300	Continuing	Continuing	Continuing	
Development Contracts	C/FFP	Various : Various	33.030	0.695		0.724		0.400		-		0.400	Continuing	Continuing	Continuing	
Subtotal			48.458	1.195		1.134		0.700		-		0.700	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
Misc Support Costs	MIPR	Various : Various	7.777	0.300		0.325		0.200		-		0.200	Continuing	Continuing	Continuing	
Subtotal			7.777	0.300		0.325		0.200		-		0.200	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	
Testing Costs	MIPR	Various : Various	24.250	1.799		0.945		0.725		-		0.725	Continuing	Continuing	Continuing	
Subtotal			24.250	1.799		0.945		0.725		-		0.725	Continuing	Continuing	N/A	
Project Cost Totals			95.573	3.493		2.612		1.825		-		1.825	Continuing	Continuing	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018			
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>			Project (Number/Name) S53 / <i>Clothing And Equipment</i>				
	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S53 / <i>Clothing And Equipment</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023																											
	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																								
UNIFORM CLOTHING																																																				
Next Gen Insect repellent Testing																																																				
Flame Resistant Clothing Upgrades																																																				
Improve Signature Mgmt (IR) Eval & Camo in Clothing & Equ																																																				
INDIVIDUAL EQUIPMENT																																																				
TIC/TIM Water Purification Testing																																																				
Fabric SWIR																																																				
Water Treatment/Desalinization																																																				
CW/ECW Clothing Improvements																																																				
CW/ECW Handwear																																																				
CW/ECW Footwear																																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S53 / <i>Clothing And Equipment</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
UNIFORM CLOTHING	1	2008	4	2023
Next Gen Insect repellent Testing	1	2020	4	2020
Flame Resistant Clothing Upgrades	1	2009	4	2023
Improve Signature Mgmt (IR) Eval & Camo in Clothing & Equipment	2	2012	4	2018
INDIVIDUAL EQUIPMENT	1	2009	4	2018
TIC/TIM Water Purification Testing	3	2020	3	2021
Fabric SWIR	4	2015	4	2019
Water Treatment/Desalinization	1	2023	4	2023
CW/ECW Clothing Improvements	1	2021	4	2021
CW/ECW Handwear	1	2018	4	2018
CW/ECW Footwear	1	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>
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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
<i>S54: Small Arms Improvement</i>	-	11.649	6.851	7.687	-	7.687	10.566	16.108	19.243	15.284	0.000	87.388
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The FY 2019 funding request was reduced by \$(2.491) million to account for the availability of prior year execution balances. FY 2019 New starts include Next Generation Fire Control (Crew and Served).

A. Mission Description and Budget Item Justification

The Small Arms Improvement Advanced Component Development and Prototypes (ACD&P) program provides funds to mature, demonstrate, test and evaluate emerging technology from Joint Service Small Arms Program (JSSAP), Project 627, Program Element 0603607A, (Budget Activity 3), Defense Advanced Research Projects Agency (DARPA), Department of Energy National Laboratories, Research Development & Engineering Centers (RDECs) and other domestic and foreign sources for small arms weapons systems and technology. Small arms systems include weapons ranging up to 40 millimeter in caliber. Current and future efforts focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, usability, training effectiveness and reliability of weapons to include ammunition when developing and/or evaluating standard and non-standard weapons. Focus areas include the maturing of technology through testing and evaluation of sub-system or system prototypes which demonstrates light weight materials, wear resistant/protective/anti-reflective coatings, observation/situational awareness improvements, human-systems integration, robotic armament capability, non-lethal capability, and equipment enhancements. Benefits include continuous improvements to small arms weapons, fire control equipment, optics, gun barrels, training devices, suppressors, component mounts, weapon mounts, and weapon/ammunition interface. Includes costs associated with efforts for integration and interface of products on Soldiers' head, body and weapons.

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

	FY 2017	FY 2018	FY 2019
Title: New Weapons	1.524	0.100	1.000
Description: Development of new small arms weapons			
FY 2018 Plans: Next Generation Squad Automatic Rifle: Continues to support the finalization of the Capability Development Document and Acquisition Strategy/Plan and schedule to support the Engineering and Manufacturing Development phase for the Next Generation Squad Automatic Rifle and determine details for technologies that will be pursued to meet the Soldier requirements. Externally Powered Mounted Machine Gun: Continues to support the development of the Capability Development Document with Maneuver Center of Excellence using data received from initial engineering design and prototype testing of functional objectives including increased lethality, expansion of mission roles and operational utility (using a single weapon) through enhanced precision and multiple firing modes.			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>New Weapons Evaluations and Assessments: Performs initial evaluation and assessment of new weapons.</p> <p>FY 2019 Plans: Next Generation Squad Automatic Rifle (NGSAR): Transition of technologies from Program Element 0603827A S54 to Program Element 0604601A EW4: Will work to coordinate and develop the Capability Development Document (CDD), Acquisition Strategy, Capability Production Document (CPD), and provide data from various technologies to better inform stakeholders. Will begin EMD phase for the Next Generation Squad Automatic Rifle.</p> <p>Externally Powered Mounted Machine Gun renamed to Externally Powered Weapon (EPW): Will continue to support the development of the Capability Development Document (CDD) with Maneuver Center of Excellence and Maneuver Support Center of Excellence. Intend to leverage information gathered from prototype testing and develop a demonstrator to better evaluate and inform the CDD and the various platforms that may include the EPW as their Armament System.</p> <p>New Weapons Evaluations and Assessments: Will continue to perform initial evaluation and assessment of new weapons.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding increase</p>				
<p>Title: Small Arms Weapons Enhancements</p> <p>Description: Enhancements and developments of small arms weapons</p> <p>FY 2018 Plans: Recoil Reduction Mechanisms: Assesses and evaluates selected Recoil Reduction Mechanisms prototypes will be fabricated and tested for both individual and crew served weapons.</p> <p>Armaments for Robots: Begins to initiate the intelligence/networking and weapons design and functions for a man-in-the-loop, small caliber defensive armaments system on an unmanned ground vehicle including the Warfighter/Robot interface.</p> <p>Individual Non-Lethal System: Continues to monitor status of Capability Development Document and provide input into programmatic documents as necessary.</p> <p>Increased Barrel Life/Replace Chrome: Conducts test and evaluation of prototype barrels delivered in FY 2017. Pursues barrel and liner designs that can withstand higher pressures per the Small Arms Ammunition Configuration Study outputs. Further investigates and matures additive manufacturing and cold spray methodology for barrels.</p>		2.496	0.100	0.100

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2017	FY 2018	FY 2019
<p>Non-Standard Weapons Assessments: Continues to conduct baseline testing of commercial weapon systems and perform capability analysis of unique weapon characteristics. Continues to utilize test information to conduct trade off assessments of Non-Developmental Item solutions for pending requirements as well as establish safety parameters for the training mission of Regionally Aligned Forces and establish a sustainment strategy for long term support of weapons procured to support the Regionally Aligned Forces training mission. Continues to conduct market research of commercially available weapon systems.</p> <p>Small Business Innovative Research Enhancements: Future efforts continues to focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, training effectiveness and reliability of weapons.</p> <p>Protective Weapons Coatings: (includes Adaptive Lubricious Coatings): Develops manufacturing technology to support production of super hydrophobic and other coatings in support of Small Arms Weapons. Assesses and evaluates current manufacturing process studies and assessments to adapt the coating technology into weapon Original Equipment Manufacturer manufacturing processes.</p> <p>Weapon Upgrades and Accessories: Tests, evaluates and analyzes ongoing and new activities to enhance small arms weapons.</p> <p>FY 2019 Plans: Recoil Reduction Mechanisms: Will continue to assess and evaluate selected Recoil Reduction Mechanisms prototypes will be fabricated and tested for both individual and crew served weapons.</p> <p>Armaments for Robots: Will continue to initiate the intelligence/networking and weapons design and functions for a man-in-the-loop, small caliber defensive armaments system on an unmanned ground vehicle including the Warfighter/Robot interface.</p> <p>Increased Barrel Life/Replace Chrome: Will continue test and evaluation of prototype barrels delivered in FY 2017. Pursues barrel and liner designs that can withstand higher pressures per the Small Arms Ammunition Configuration Study outputs. Further investigates and matures additive manufacturing and cold spray methodology for barrels.</p> <p>Non-Standard Weapons Assessments: Will continue to conduct baseline testing of commercial weapon systems and perform capability analysis of unique weapon characteristics. Continues to utilize test information to conduct trade off assessments of Non-Developmental Item solutions for pending requirements as well as establish safety parameters for the training mission of Regionally Aligned Forces and establish a sustainment strategy for long term support of weapons procured to support the Regionally Aligned Forces training mission. Continues to conduct market research of commercially available weapon systems.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Small Business Innovative Research Enhancements: Future efforts will continue to focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, training effectiveness and reliability of weapons.				
Protective Weapons Coatings: (includes Adaptive Lubricious Coatings): Will continue to develop manufacturing technology to support production of super hydrophobic and other coatings in support of Small Arms Weapons. Will assess and evaluate current manufacturing process studies and assessments to adapt the coating technology into weapon Original Equipment Manufacturer manufacturing processes.				
Weapon Upgrades and Accessories: Will continue to test, evaluate and analyze ongoing and new activities to enhance small arms weapons.				
Title: Ammunition		0.855	0.100	0.100
Description: Small arms ammunition improvement				
FY 2018 Plans: Ammunition Upgrades: Evaluates the effect of new ammunition on small arms weapons.				
FY 2019 Plans: Ammunition Upgrades: Will continue to evaluate the effect of new ammunition on small arms weapons.				
Title: Combat Optics		0.100	0.100	0.100
Description: Improvement of small arms combat optics				
FY 2018 Plans: Optics Upgrades: Evaluates state of the art advances in optical component technologies for inclusion in future products, including Mounted Machinegun Optic Capability Production Document, Fire Control Capability Development Document, and its associated annexes.				
FY 2019 Plans: Optics Upgrades: Will continue to evaluate state of the art advances in optical component technologies for inclusion in future products, including Mounted Machinegun Optic Capability Production Document, Fire Control Capability Development Document, and its associated annexes.				
Title: Fire Control		6.574	6.351	6.287
Description: Small arms fire control				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p><i>FY 2018 Plans:</i></p> <p>Next Generation Spotting Scope: Consolidates readily available and mature fire-control/target acquisition component technologies into a variable magnification spotting scope.</p> <p>Next Generation Binocular: Assesses and evaluates incorporating existing target acquisition/fire control component technologies into binoculars.</p> <p>Sniper Missed Distance Corrective Offset: Assesses and evaluates from a sniper team (shooter's) location, tracks sniper's bullet trace to target to derive a missed distance correct offset for a follow-on shot.</p> <p>Small Arms Fire Control ? Crew Program of Record: Supports Crew Served Fire Control requirements tests and studies, Milestone B documentation generation, and transition to 0604601AFF2: Infantry Support Weapons.</p> <p>Small Arms Fire Control ? Squad Program of Record: Conducts prototyping activities to advance fire control technologies on carbine and rifle weapon platforms. Addresses Size, Weight, and Power trade space challenges associated with fire control on the individual squad weapons.</p> <p>Small Arms Fire Control ? Crew Enhancements: Continues support and oversight for exploring future fire control applications for Crew Served Weapons to include objective requirements of the Capability Development Document, Small Business Innovative Research, and digital enhancements.</p> <p>Small Arms Fire Control ? Precision Enhancements: Supports the following precision fire control enhancements: target detection to improve battlefield reconnaissance and intelligence gathering capabilities, improve target acquisitions at extended ranges in all battlefield conditions, target tracking, down range wind sensing technology, bullet tracking, weapon bore sensor, automated muzzle velocity tracker to improve fire control accuracy, far-target location, battlefield networking, and augmented reality. Provides support to Small Business Innovative Research efforts that will explore the feasibility, scientific merit, research and development, and commercialization of future Precision fire control system.</p> <p>Fire Control Upgrades: Initiates testing of advanced fire control systems for small arms platforms to define the acquisition strategy in support of the Capability Development Document consisting of individual weapons, sniper/precision, crew served weapons, low and high velocity 40mm.</p> <p><i>FY 2019 Plans:</i></p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>FY 2019 New start: Next Generation Fire Control (Crew Served and Squad): Will support integration with Next Generation Squad Weapons, and specifically address aim augmentation, target tracking, secure wireless transmission, environmental sensing, and optical enhancements.</p> <p>Next Generation Spotting Scope: Will continue to consolidate readily available and mature fire-control/target acquisition component technologies into a variable magnification spotting scope.</p> <p>Next Generation Binocular: Will continue to assess and evaluate incorporating existing target acquisition/fire control component technologies into binoculars.</p> <p>Sniper Missed Distance Corrective Offset: Will continue to assess and evaluate from a sniper team (shooter's) location, tracks sniper's bullet trace to target to derive a missed distance correct offset for a follow-on shot.</p> <p>Small Arms Fire Control Squad Program of Record: Will continue to conduct prototyping activities to advance fire control technologies on carbine and rifle weapon platforms. Will address Size, Weight, and Power trade space challenges associated with fire control on the individual squad weapons. Will transition to Program Element 0604601A Project FF2 Small Arms Fire Control.</p> <p>Small Arms Fire Control Crew Enhancements: Will continue support and oversight for exploring future fire control applications for Crew Served Weapons to include objective requirements of the Capability Development Document, Small Business Innovative Research, and digital enhancements.</p> <p>Small Arms Fire Control Precision Enhancements: Will continue to support and explore future precision fire control enhancements which includes: target detection to improve battlefield reconnaissance and intelligence gathering capabilities, improve target acquisitions at extended ranges in all battlefield conditions, improve anti-reflection (AR) coating to minimize scope glints, and counter optical augmentation that can disclose soldiers' location, target tracking, down range wind sensing technology, bullet tracking, weapon bore sensor, automated muzzle velocity tracker to improve fire control accuracy, far-target location, battlefield networking, and augmented reality. To provide support to Small Business Innovative Research efforts that will explore the feasibility, scientific merit, research and development, and commercialization of future Precision fire control system.</p> <p>Fire Control Upgrades: Will continue testing of advanced fire control systems for small arms platforms to define the acquisition strategy in support of the Capability Development Document consisting of individual weapons, sniper/precision, crew served weapons, low and high velocity 40mm.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
Funding increase..			
Title: Research and Analysis	0.100	0.100	0.100
Description: Research and analysis of small arms			
FY 2018 Plans: Initiate Market Research and Benefit Analysis of 360 degree situational awareness, active stabilization, advanced kinetic weapons, low flying drone engagement, and other small arms research.			
FY 2019 Plans: Will continue to initiate Market Research and Benefit Analysis of 360 degree situational awareness, active stabilization, advanced kinetic weapons, low flying drone engagement, and other small arms research.			
Accomplishments/Planned Programs Subtotals	11.649	6.851	7.687

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
• S63: <i>Individual Weapons Engineering Development</i>	7.631	6.961	5.756	-	5.756	6.129	23.352	22.556	16.810	0.000	89.195
• EW4: <i>Crew Served Weapons Engineering Development</i>	7.708	9.251	29.611	-	29.611	26.362	39.780	18.041	18.983	0.000	149.736
• FF2: <i>Small Arms Fire Control</i>	-	20.117	20.201	-	20.201	21.463	10.163	11.254	4.967	0.000	88.165
• FI2: <i>Lightweight 30mm Cannon</i>	-	5.500	0.000	-	0.000	1.384	-	-	-	0.000	6.884
• 627: <i>Jt Svc Sa Prog (JSSAP)</i>	5.615	5.796	5.885	-	5.885	4.604	4.696	6.249	6.374	0.000	39.219

Remarks
 In support of Small Arms Initial Capability and Capability Development Requirements, advanced technology of Small Arms Weapons is transitioned from Joint Service Small Arms Program (JSSAP), Project 627, Program Element 0603607A, (Budget Activity 3) to Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4). After the technology is demonstrated and/or validated, the program transitions to Infantry Support Weapons, Program Element 0604601A, (Budget Activity 5) for engineering and manufacturing development.

D. Acquisition Strategy
 Primary strategy is to study, develop, demonstrate and evaluate emerging technologies that ultimately lead to enhancing/improving the small arms inventory.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>

<u>E. Performance Metrics</u> N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603827A / Soldier Systems - Advanced Development				S54 / Small Arms Improvement							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management	Allot	PM Soldier Weapons, : Picatinny Arsenal	3.449	1.389	Mar 2017	0.566	Mar 2018	0.400	Mar 2019	-		0.400	Continuing	Continuing	Continuing
Subtotal			3.449	1.389		0.566		0.400		-		0.400	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Hardware Development	MIPR	Army Research Development Engineering Centers, : Multiple	10.375	1.000	Mar 2017	0.335	Mar 2018	1.009	Mar 2019	-		1.009	Continuing	Continuing	Continuing
Subtotal			10.375	1.000		0.335		1.009		-		1.009	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Engineering	MIPR	Army Research Development Engineering Centers, : Multiple	19.615	5.165	Mar 2017	4.965	Mar 2018	3.778	Mar 2019	-		3.778	Continuing	Continuing	Continuing
Subtotal			19.615	5.165		4.965		3.778		-		3.778	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Developmental Testing	MIPR	Army Test and Evaluation Centers, : Multiple	9.766	4.095	Mar 2017	0.985	Mar 2018	2.500	Mar 2019	-		2.500	Continuing	Continuing	Continuing

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>
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Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
NEW WEAPONS																												
Next Generation Squad Automatic Rifle																												
Externally Powered Weapon (EPW)																												
New Weapons Evaluations and Assessments																												
SMALL ARMS WEAPONS ENHANCEMENTS																												
Recoil Reduction Mechanisms																												
Armaments for Robots																												
Individual Non-Lethal System																												
Increased Barrel Life/Replace Chrome																												
Non-Standard Weapon Assessments																												
Small Business Innovative Research																												
Protective Weapons Coatings (includes Adaptive Lubricious Coatings)																												
Weapons Upgrades and Accessories																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
AMMUNITION																												
Small Arms Ammunition Configuration Study																												
Ammunition Upgrades																												
COMBAT OPTICS																												
Optics Upgrades																												
FIRE CONTROL																												
Next Generation Fire Control (Crew Served and Squad)																												
Next Generation Spotting Scope																												
Sniper Missed Distance Corrective Offset																												
Small Arms Fire Control - Crew Program of Record																												
Small Arms Fire Control - Squad Program of Record																												
Small Arms Fire Control - Crew Enhancements																												
Small Arms Fire Control - Precision Enhancements																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Small Arms Ballistic Kernel																												
Small Arms Fire Control Upgrades																												
RESEARCH AND ANALYSIS																												
Research and Analysis of Small Arms																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NEW WEAPONS	1	2008	4	2023
Next Generation Squad Automatic Rifle	1	2014	4	2019
Externally Powered Weapon (EPW)	1	2015	4	2019
New Weapons Evaluations and Assessments	1	2017	4	2023
SMALL ARMS WEAPONS ENHANCEMENTS	1	2008	4	2023
Recoil Reduction Mechanisms	1	2018	4	2020
Armaments for Robots	1	2018	4	2020
Individual Non-Lethal System	1	2013	4	2018
Increased Barrel Life/Replace Chrome	1	2011	4	2019
Non-Standard Weapon Assessments	4	2011	4	2023
Small Business Innovative Research	1	2015	4	2023
Protective Weapons Coatings (includes Adaptive Lubricious Coatings)	1	2016	4	2023
Weapons Upgrades and Accessories	1	2010	4	2023
AMMUNITION	1	2008	4	2023
Small Arms Ammunition Configuration Study	4	2014	4	2017
Ammunition Upgrades	1	2016	4	2023
COMBAT OPTICS	1	2008	4	2023
Optics Upgrades	1	2016	4	2023
FIRE CONTROL	1	2008	4	2023
Next Generation Fire Control (Crew Served and Squad)	1	2019	4	2022
Next Generation Spotting Scope	1	2018	4	2019
Sniper Missed Distance Corrective Offset	1	2018	4	2022

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) S54 / <i>Small Arms Improvement</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
Small Arms Fire Control - Crew Program of Record	1	2017	4	2018
Small Arms Fire Control - Squad Program of Record	1	2017	4	2019
Small Arms Fire Control - Crew Enhancements	1	2017	4	2023
Small Arms Fire Control - Precision Enhancements	1	2017	4	2023
Small Arms Ballistic Kernel	1	2016	4	2017
Advanced Hyperspectral Target Acquisition	1	2014	4	2016
Small Arms Fire Control Upgrades	1	2008	4	2023
RESEARCH AND ANALYSIS	1	2012	4	2023
Research and Analysis of Small Arms	1	2015	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>				Project (Number/Name) VS4 / <i>Soldier Protective Equipment</i>			
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
VS4: <i>Soldier Protective Equipment</i>	-	38.691	10.281	8.136	-	8.136	2.836	4.444	4.909	6.488	0.000	75.785
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding in the amount of \$8.224 million supports efforts to evaluate integrated technologies and representative or prototype systems that help expedite Individual Soldier Ballistic Protection technology transition from the laboratory to operational use.

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

	FY 2017	FY 2018	FY 2019
Title: Soldier Protective Equipment (SPE)	38.691	10.281	8.136
Description: Effort is to increase the Warfighter lethality and mobility by optimizing Soldier protection while effectively managing all life cycle aspects of Personal Protective Equipment (PPE).			
FY 2018 Plans: Initiate Technology/Maturation and Risk Reduction efforts across the Personal Protection Equipment (PPE) portfolio (extremities, torso and vital torso, head, eye and face protection) to support Soldier Protection System (SPS) requirements for lighter weight ballistic materials with improved performance and manufacturing/testing process improvements. If ready, initiate proof-of-principle demonstrations on promising new materials, technologies and or applique? in simulated and instrumented field exercises to evaluate SPS upgrades and inform stakeholders of new operational capabilities to enhance SPS. Continue efforts to characterize and increase durability and functional service life of existing personal protective systems at the subsystem/component level. Continue to develop the methodology for PPE shelf and service life, and to advance the novel modeling method for PPE performance. Continue the development of improved projectile yaw and velocity measurement for existing systems and emerging requirements including evaluation of subsystem technologies to counter Explosive Ordnance Disposal (EOD) threats.			
FY 2019 Plans: Will continue Technology/Maturation and Risk Reduction efforts across the PPE portfolio to support SPS requirements for lighter weight ballistic materials with improved performance and manufacturing/testing process improvements. If ready, initiate proof-of-principle demonstrations on promising new materials (such as Polyethylene film technology), and in simulated and instrumented field exercises, evaluate upgrades and inform stakeholders of new operational capabilities. Continue efforts to characterize and increase durability, shelf life, and functional service life of existing personal protective systems at the subsystem/component level. Continue the development of improved measurement processes for existing systems and emerging requirements including evaluation of subsystem technologies to counter EOD threats.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) VS4 / <i>Soldier Protective Equipment</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
Funding decrease in Soldier Protective Equipment portfolio is due to anticipated reduced requirements in FY18 and FY19. Also, FY17 received a \$23M Congressional plus up.			
Accomplishments/Planned Programs Subtotals	38.691	10.281	8.136

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
• VS5: RDTE, 0604601A.VS5, <i>Soldier Protective Equipment</i>	2.114	1.758	6.057	-	6.057	6.777	8.482	9.826	9.655	0.000	44.669

Remarks

D. Acquisition Strategy

Programs pursue technology maturation and prototype development, culminating in the transition of mature technologies (Technology Readiness Levels (TRL) 6-7) to Engineering and Manufacturing Development. This project continues to exercise competitively awarded contracts using best value source selection procedures where applicable.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603827A / Soldier Systems - Advanced Development				VS4 / Soldier Protective Equipment							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management Support	Allot	PM SPIE Various : Various	0.350	1.000		1.009		1.000		-		1.000	0.000	3.359	-
Subtotal			0.350	1.000		1.009		1.000		-		1.000	0.000	3.359	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Dev/Sys Engineering Spt	MIPR	Various : Various	5.352	2.707		0.727		0.764		-		0.764	Continuing	Continuing	-
Dev/Integ Contracts	TBD	Various : Various	13.966	19.397		5.861		3.612		-		3.612	Continuing	Continuing	Continuing
Subtotal			19.318	22.104		6.588		4.376		-		4.376	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Misc Support Costs	MIPR	Various : Various	1.900	2.025		0.200		0.200		-		0.200	Continuing	Continuing	Continuing
Subtotal			1.900	2.025		0.200		0.200		-		0.200	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Ballistic/Blast/Nonballistic Testing	MIPR	Various : Various	3.228	13.562		2.484		2.560		-		2.560	Continuing	Continuing	Continuing
Subtotal			3.228	13.562		2.484		2.560		-		2.560	Continuing	Continuing	N/A
Project Cost Totals			24.796	38.691		10.281		8.136		-		8.136	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018			
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>			Project (Number/Name) VS4 / <i>Soldier Protective Equipment</i>				
	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) VS4 / <i>Soldier Protective Equipment</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
SPS Technology Upgrade Insertion	[Redacted]																											
VTP Technology Upgrade Insertion	[Redacted]																											
TEP Technology Upgrade Insertion	[Redacted]																											
Helmet Technology Upgrade Insertion	[Redacted]																											
TCEP APEL Update					▲ 1																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603827A / <i>Soldier Systems - Advanced Development</i>	Project (Number/Name) VS4 / <i>Soldier Protective Equipment</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SPS Technology Upgrade Insertion	1	2017	4	2023
VTP Technology Upgrade Insertion	1	2020	4	2023
TEP Technology Upgrade Insertion	1	2020	4	2023
Helmet Technology Upgrade Insertion	1	2020	4	2023
TCEP APEL Update	1	2018	1	2018

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>
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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	-	0.000	39.608	95.660	-	95.660	15.677	16.177	10.718	6.321	0.000	184.161
FD2: <i>Soldier Robotics Systems</i>	-	0.000	1.512	2.107	-	2.107	2.826	3.328	3.306	3.357	0.000	16.436
FD3: <i>Battery Modernization & Interface Standardization</i>	-	0.000	0.847	0.849	-	0.849	0.000	0.000	0.000	0.000	0.000	1.696
FD9: <i>Robotics Systems</i>	-	0.000	37.249	92.704	-	92.704	12.851	12.849	7.412	2.964	0.000	166.029

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE0604017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

FD2: Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power.

FY 2019 RDTE funds enable support to capability development of the Common Robotics System (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), Common Robotic System (Universal Controller) (CRS(UC)), Common Robotic System (Communication Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intelligence) (CRS(MS/AI)), Render Safe - Sets, Kits and Outfits (RS-SKO), Enhanced Robotics Payload (ERP), Chemical, Biological, Radiological, and Nuclear (CBRN); small, pocket sized, airborne sensors, etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).

FY 2019 RDTE funding also supports the Soldier Exoskeleton. The Exoskeleton amplifies the strength, endurance, and mobility of its operator, the Soldier. The Soldier Exoskeleton capabilities provide the Army with a deployable, personal tactical performance enhancer. Soldier Exoskeleton variants will be capable of operating in a wide range of environments, enhancing combat operations.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	
<p>FD3: The Battery Modernization & Interface Standardization (BMIS) program was established to help bring greater power efficiency and effectiveness to the dismounted Soldier, and to reduce the proliferation of proprietary batteries across the Army. BMIS will develop the Army Standard Family of Batteries (SFoB), a central acquisition management authority, and reduce 38 Communications-Electronics (C-E) battery types, currently in use, to just three. Battery standardization and policy enforcement will support Operational Readiness at a reduced cost to the Army while maintaining configuration management, life cycle support, safety standards, and technological upgrades.</p> <p>FD9: Robotics Systems for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits.</p> <p>FY 2019 RDTE funds enable support to capability development of Tactical Wheeled Vehicle - Leader Follower (TWV-LF), Automated Convoy Operations (ACO), Dismounted Engineer Mobility System (DEMS), modular mission payloads, Route Clearance & Interrogation System (RCIS) Type II, Robotic Combat Vehicle - Robotic Wingman (RCV-RW), etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).</p> <p>FY 2019 RDTE Product Manager Applique and Large Unmanned Ground Systems funding supports Leader Follower and Robotic Combat Vehicle program transitions from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial prototype testing. This will stress the autonomy systems and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations.</p> <p>FD9: Tactical Wheeled Vehicle - Leader Follower (TWV-LF) will provide a limited autonomous vehicle capability to the Palletized Load System (PLS) A1. TWV-LF will provide capability for a manned Leader vehicle with up to seven (7) unmanned Follower vehicles. Initial efforts by the United States Army Tank Automotive Research, Development and Engineering Center (TARDEC) will control up to three (3) optionally manned Follower vehicles with a designated Leader vehicle. The manned Leader vehicle wirelessly provides direction and speed guidance to the Follower vehicles to follow the Leader vehicle with no driver input or unmanned. The primary purposes for Leader Follower are to improve Force Protection and increase Logistics Throughput. Funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology.</p> <p>FY 2019 RDTE Leader Follower funding will continue the fabrication and testing of up to 140 Leader Follower PLS A1 vehicles for user operational assessment in FORSCOM identified units. Systems will go through an Army Test and Evaluation Command (ATEC) safety assessment and plan for Urgent Materiel Release based on</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>
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the signed Leader Follower Directed Requirement. The issued Leader Follower systems will go through a 12 month Operational Technology Demonstration on CONUS installations to provide user feedback and assessment on the truck performance to inform a future milestone decision for a follow on Leader Follower program of record.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	39.608	69.070	-	69.070
Current President's Budget	0.000	39.608	95.660	-	95.660
Total Adjustments	0.000	0.000	26.590	-	26.590
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	26.590	-	26.590

Change Summary Explanation

FY2019 increase in the amount of \$26.6 million supports efforts related to Tactical Wheeled Vehicle - Leader Follower and Robotic Combat Vehicle Experimental Unit Prototypes.

 In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems. Funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE604017A Robotics Development, Project FD9 Robotics Systems.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>				Project (Number/Name) FD2 / <i>Soldier Robotics Systems</i>			
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
FD2: <i>Soldier Robotics Systems</i>	-	0.000	1.512	2.107	-	2.107	2.826	3.328	3.306	3.357	0.000	16.436
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE0604017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power.

FY 2019 RDTE funds enable support to capability development of the Common Robotics System (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), Common Robotic System (Universal Controller) (CRS(UC)), Common Robotic System (Communication Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intelligence) (CRS(MS/AI)), Render Safe - Sets, Kits and Outfits (RS-SKO), Enhanced Robotics Payload (ERP), Chemical, Biological, Radiological, and Nuclear (CBRN); small, pocket sized, airborne sensors, etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).

FY 2019 RDTE funding also supports the Soldier Exoskeleton. The Exoskeleton amplifies the strength, endurance, and mobility of its operator, the Soldier. The Soldier Exoskeleton capabilities provide the Army with a deployable, personal tactical performance enhancer. Soldier Exoskeleton variants will be capable of operating in a wide range of environments, enhancing combat operations.

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

	FY 2017	FY 2018	FY 2019
Title: Soldier Borne Sensor (SBS) / Exoskeleton	-	0.344	1.534

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD2 / <i>Soldier Robotics Systems</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
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Description: The SBS provides the small unit a "quick look" capability with improved Situational Awareness of routes, buildings, tunnels, obstacles blocking line of sight, and similar concealed threat locations. The budget activity enables payload improvements including camera enhancements, target identification algorithms, display/controller improvements and user notifications for specific items of interest.

FY 2018 Plans:
Develop initial program cost estimates, conduct market surveys, perform Analyses of Alternatives (AoA), and initiate Request for Proposal (RFP) work for incorporation in the CDD/CPD.

FY 2019 Plans:
Provide for the capability of transitioning and continuing development of Industry and DoD Exoskeleton efforts to augment the warfighter strengths and human performance to reduce Soldier load. Provide for the integration and evaluation of potential exoskeleton solutions and completion of initial technical and programmatic data to inform capability requirement generation and subsequent materiel development decision.

FY 2018 to FY 2019 Increase/Decrease Statement:
Reduced funding cost in FY 2019 from FY 2018 requirements.

Title: UGV Soldier Robotics Development	-	1.168	0.573
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Description: Soldier Robotics Development is designed to facilitate the transition of robotics and autonomous systems technology into Programs of Record. It informs the acquisition process beforehand allowing the Maneuver Center of Excellence, Sustainment Center of Excellence, Maneuver Support Center of Excellence, and the Cyber Center of Excellence the ability to make integration decisions and affordability trades while writing requirements. UGV Robotics Development will fund Common Robotics System (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), Common Robotic System (Universal Controller) (CRS(UC)), Common Robotic System (Communication Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intelligence) (CRS(MS/AI)), Render Safe - Sets, Kits and Outfits (RS-SKO), Enhanced Robotics Payload (ERP), Chemical, Biological, Radiological, and Nuclear (CBRN); small, pocket sized, airborne sensors, etc.

FY 2018 Plans:
Develop initial program cost estimates, conduct market surveys, perform Analyses of Alternatives (AoA), and initiate Request for Proposal (RFP) work for incorporation into the CDD/CPD.

FY 2019 Plans:

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD2 / <i>Soldier Robotics Systems</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
Develop initial program cost estimates, conduct market surveys, perform/update Analysis of Alternatives (AoA) or letter of sufficiency, perform risk reduction activities and maturation technology efforts, initiate milestone documentation and prepare Request for Proposal (RFP).			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Reduced funding due to requirements for CRS(H) being moved to alternate funding line, 655053 FB9.			
Accomplishments/Planned Programs Subtotals	-	1.512	2.107

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
• FB8: <i>FB8 - Soldier Borne Sensor (SBS) (PE 06050553A)</i>	-	2.289	3.506	-	3.506	1.530	1.227	2.266	3.591	Continuing	Continuing
• W63798: <i>Soldier Borne Sensor (SBS) (SSN W63798)</i>	-	3.000	11.824	-	11.824	15.531	18.454	3.823	11.866	Continuing	Continuing

Remarks
Pre-acquisition program activities funded by this line transition to a separate Program Element and Project prior to their first program acquisition Milestone (B or C).

D. Acquisition Strategy
Soldier Robotics Systems will utilize a Robotics Development funding for internal systems engineering, requirements and architecture analysis, AoAs and Technology Readiness Assessments with the PM's S&T partners, and studies & analysis in support of program initiation with industry.

Initial Exoskeleton efforts will focus on prototyping emerging Industry and DoD Exoskeleton initiatives, assessing their performance through demonstrations and Soldier feedback that will inform capability requirement definition and subsequent materiel develop decision. These initiatives may range from Commercial-Off-The Shelf (COTS) solutions to developmental efforts.

E. Performance Metrics
N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD2 / <i>Soldier Robotics Systems</i>
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Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Soldier Robotic Systems FY 2018					Study/Analysis																							
Soldier Robotic Systems FY 2019					Study/Analysis																							
Soldier Robotic Systems FY 2020					Study/Analysis																							
Soldier Robotic Systems FY 2021					Study/Analysis																							
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)					Study/Analysis																							
Analysis of Alternatives / Letter of Sufficiency					AoA/LoS																							
Market Survey					Market Survey																							
Request for Proposal (Development/Staffing)					RFP (Development/Staffing)																							
Studies/Analysis	Study/Analysis																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD2 / <i>Soldier Robotics Systems</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Soldier Robotic Systems FY 2018	1	2018	4	2018
Soldier Robotic Systems FY 2019	1	2019	4	2019
Soldier Robotic Systems FY 2020	1	2020	4	2020
Soldier Robotic Systems FY 2021	1	2021	4	2021
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)	1	2018	4	2023
Analysis of Alternatives / Letter of Sufficiency	1	2018	4	2023
Market Survey	1	2018	4	2023
Request for Proposal (Development/Staffing)	1	2018	2	2024
Studies/Analysis	1	2018	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>				Project (Number/Name) FD3 / <i>Battery Modernization & Interface Standardization</i>			
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
FD3: <i>Battery Modernization & Interface Standardization</i>	-	0.000	0.847	0.849	-	0.849	0.000	0.000	0.000	0.000	0.000	1.696
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE0604017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

The Battery Modernization & Interface Standardization (BMIS) program was established to help bring greater power efficiency and effectiveness to the dismounted Soldier, and to reduce the proliferation of proprietary batteries across the Army. BMIS will develop the Army Standard Family of Batteries (SFoB), a central acquisition management authority, and reduce 38 Communications-Electronics (C-E) battery types, currently in use, to just three. Expand to include batteries for generators and hybrids, robotics, vehicles, and low density/usage systems. Battery standardization and policy enforcement will support Operational Readiness at a reduced cost to the Army while maintaining configuration management, life cycle support, safety standards, and technological upgrades.

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

	FY 2017	FY 2018	FY 2019
Title: Acquisition Strategy	-	0.212	0.210
Description: Complete advanced development pre-milestone B assessments and analysis.			
FY 2018 Plans: Complete advanced development pre-milestone B technology assessments and analysis. Conduct C-E battery market research/ Requests for Information (RFI). Develop Acquisition Strategy and Requests for Proposals (RFPs).			
FY 2019 Plans: Finalize advanced development technology assessments and analysis. Conduct C-E battery analysis of market research/ Requests for Information (RFI). Develop Acquisition Strategy for the BMIS program.			
FY 2018 to FY 2019 Increase/Decrease Statement: FY19 funding to finalize advanced development technology assessments and analysis in support of the Acquisition Strategy for the BMIS program increased slightly from FY18.			
Title: BMIS Standard Family of Batteries (SFoB) Design	-	0.635	0.639

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD3 / <i>Battery Modernization & Interface Standardization</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>Description: Finalize research and complete assessment of technology and portfolios. Once the SFoB has been established, maintenance and updates will be made as technology advances.</p> <p>FY 2018 Plans: Assess the current C-E Battery Portfolio. Complete the C-E Battery technology assessment. Determine a solid and integrated core Standard Family of Batteries that will align with the BMIS mission. Prepare solicitation for development of advanced prototype requirements for C-E batteries.</p> <p>FY 2019 Plans: Finalize the C-E Battery technology assessment. Determine a solid and integrated core Standard Family of Batteries to include batteries for generators and hybrids, robotics, vehicles, and low density/usage systems.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY19 funding to finalize the C-E Battery technology assessment and determine a solid and integrated core Standard Family of Batteries to include batteries for generators and hybrids, robotics, vehicles, and low density/usage systems increased slightly over FY18. .</p>			
Accomplishments/Planned Programs Subtotals	-	0.847	0.849

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

Remarks

D. Acquisition Strategy
BMIS will expand the Army Standard Family of Batteries to include C-E, batteries for generators and hybrids, robotics, vehicles, and low density/usage systems. BMIS will continue to investigate technology advancements of batteries for these systems, and provide information and recommendations to applicable Program Managers.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD3 / <i>Battery Modernization & Interface Standardization</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
BMIS Design	Various	Various : Fort Belvoir	-	-		0.269		0.272		-		0.272	0.000	0.541	-
Subtotal			-	-		0.269		0.272		-		0.272	0.000	0.541	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
BMIS SFoB Prototype Development	Various	Various : Fort Belvoir, VA	-	-		0.366		0.371		-		0.371	0.000	0.737	-
Subtotal			-	-		0.366		0.371		-		0.371	0.000	0.737	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
BMIS Program Support	Various	Various : Fort Belvoir	-	-		0.212		0.206		-		0.206	0.000	0.418	-
Subtotal			-	-		0.212		0.206		-		0.206	0.000	0.418	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			-	-		0.847		0.849		-		0.849	0.000	1.696	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD3 / <i>Battery Modernization & Interface Standardization</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Battery Portfolio Assessment/Design																												
Army Standard Family of Batteries (SFoB) Updates																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD3 / <i>Battery Modernization & Interface Standardization</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Battery Portfolio Assessment/Design	1	2018	4	2019
Army Standard Family of Batteries (SFoB) Updates	1	2018	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>				Project (Number/Name) FD9 / <i>Robotics Systems</i>			
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
FD9: <i>Robotics Systems</i>	-	0.000	37.249	92.704	-	92.704	12.851	12.849	7.412	2.964	0.000	166.029
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE04017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

Robotics Systems for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits.

FY 2019 RDTE funds enable support to capability development of Tactical Wheeled Vehicle - Leader Follower (TWV-LF), Automated Convoy Operations (ACO), Dismounted Engineer Mobility System (DEMS), modular mission payloads, Route Clearance & Interrogation System (RCIS) Type II, Robotic Combat Vehicle - Robotic Wingman (RCV-RW), etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).

FY 2019 RDTE Product Manager Applique and Large Unmanned Ground Systems funding supports Leader Follower and Robotic Combat Vehicle program transitions from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial prototype testing. This will stress the autonomy systems and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations.

Tactical Wheeled Vehicle - Leader Follower (TWV-LF) will provide a limited autonomous vehicle capability to the Palletized Load System (PLS) A1. TWV-LF will provide capability for a manned Leader vehicle with up to seven (7) unmanned Follower vehicles. Initial efforts by the United States Army Tank Automotive Research, Development and Engineering Center (TARDEC) will control up to three (3) optionally manned Follower vehicles with a designated Leader vehicle. The manned Leader vehicle wirelessly provides direction and speed guidance to the Follower vehicles to follow the Leader vehicle with no driver input or unmanned. The primary purposes for Leader Follower are to improve Force Protection and increase Logistics Throughput. Funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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FY 2019 Leader Follower funding will continue the fabrication and testing of up to 140 Leader Follower PLS A1 vehicles for user operational assessment in FORSCOM identified units. Systems will go through an Army Test and Evaluation Command (ATEC) safety assessment and plan for Urgent Materiel Release based on the signed Leader Follower Directed Requirement. The issued Leader Follower systems will go through a 12 month Operational Technology Demonstration on CONUS installations to provide user feedback and assessment on the truck performance to inform a future milestone decision for a follow on Leader Follower program of record.

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

	FY 2017	FY 2018	FY 2019
<p>Title: Tactical Wheeled Vehicle - Leader Follower (TWV-LF) - RD for PdM Applique & Large Unmanned Ground Systems (ALUGS) and RCIS Type II</p> <p>Description: Tactical Wheeled Vehicle (TWV) Leader Follower (LF) Program in PdM Applique & Large Unmanned Ground Systems (ALUGS) builds upon the Tank Automotive Research Development & Engineering Center (TARDEC) Expedient Leader Follower (ELF) Operational Technology Demonstration (OTD) to provide a limited automation capability to the Palletized Load System (PLS) A1. Current PdM efforts will lay the groundwork for future Program of Record (PoR) capability, expanding the TARDEC efforts to include up to seven (7) unmanned Follower vehicles. Funding will support cost, schedule and performance risk reduction efforts to include Capabilities Document input, close monitoring of ELF OTD activities that feed cost estimates, capture technical and test data, provide test support, develop Modeling and Simulation (M&S) use cases, and develop a Software Integration Lab (SIL).</p> <p>FY 2018 Plans: Funding supports attaining Recapitalized Palletized Load System (PLS) vehicles in an A1 configuration for test assets in support of the TARDEC Tactical Wheeled Vehicle - Leader Follower (TWV LF) Excursion applique kit purchase and install on these test vehicles; plus it funds follow on Program of Record technology insertions, technology transition and testing.</p> <p>M&S development and Initial prototype testing will refine the system performance to meet required leader follower system capabilities. Development of a Software Integration Lab (SIL), in addition to Modeling and Simulation (M&S) efforts that will stress the TWV-LF systems and ultimately reduce program of record testing requirements and costs through validated simulations.</p> <p>FY 2019 Plans: FY19 funding will support the capability development of incremental technology insertions for Program of Records (PoR), technology transitions, testing, and milestone document preparation. Modeling and Simulation (M&S) development and initial prototype testing will refine the system performance to meet required Tactical Wheeled Vehicle- Leader Follower (TWV-LF) system capabilities. Development of a TWV-LF Software Integration Lab (SIL), in addition to M&S efforts, will stress the TWV-LF systems and ultimately reduce Program of Record testing requirements, technical risks and costs through validated simulations.</p> <p>Supports capability development of RCIS Type II, Dismounted Engineer Mobility System (DEMS), and other emerging programs.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p>	-	6.264	7.002

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
FY19 funding increase supports continued Modeling and Simulation and RCIS Type II efforts.				
<p>Title: Tactical Wheeled Vehicle - Leader Follower - Tank Automotive Research Development & Engineering Center (TARDEC) Tech Demo</p> <p>Description: Tactical Wheeled Vehicle - Leader Follower (TWV-LF) provides a limited autonomous vehicle software and applique kit to ten (10) ALUGS test Palletized Load System (PLS) A1s. For the TARDEC Tech Demo, the applique kit provides a designated manned Leader vehicle which leads a line of three (3) optionally manned Follower vehicles. The Leader vehicle wirelessly provides directional and speed guidance to the Follower vehicles to follow the Leader vehicle with no driver input or unmanned. The primary purposes for Leader Follower is to improve Force Protection and increase logistics throughput. Funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology. The Army will build, and test prototype systems for safety release, Soldier use, and further technology maturation.</p> <p>FY 2018 Plans: FY 2018 funding allows the maturation and build of ten (10) Applique initial prototype Tactical Wheeled Vehicle - Leader Follower systems for testing and safety assessment, applied to the ALUGS acquired ten (10) PLS A1 test vehicles. The prototypes will integrate a by-wire kit to the existing tactical vehicle to enable remote operation of steering, braking, throttle control and other functions. An autonomy kit will also enable the platforms to operate in leader/follower mode by providing sensor information and control algorithms to control the by-wire kit. M&S development and Initial prototype testing will refine the system performance to meet required Tactical Wheeled Vehicle Leader Follower system capabilities. In addition, the funding initiates long lead item purchases for up to one hundred and forty (140) Applique systems for user operational assessment, testing, and development planned in FY19 and FY20 on additional PLS trucks in FORSCOM identified units.</p> <p>FY 2019 Plans: FY 2019 funding will continue the fabrication and testing of up to 140 Leader Follower PLS A1 vehicles for user operational assessment in FORSCOM identified units. Systems will go through an Army Test and Evaluation Command (ATEC) safety assessment and plan for Urgent Materiel Release based on the signed Leader Follower Directed Requirement. The issued Leader Follower systems will go through a 12 month Operational Technology Demonstration on CONUS installations to provide user feedback and assessment on the truck performance to inform a future milestone decision for a follow on Leader Follower program of record. Funding supports Robotic Combat Vehicle - Robotic Wingman (RCV-RW) Joint Capabilities Technology Demonstration (JCTD).</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY19 increase in funding supports the installation of Leader Follower (LF) capability into additional trucks, provides for safety testing of the original 10 system installations and funds 12 months of Operational Technology Demonstration.</p>		-	30.000	44.500
Title: Robotic Combat Vehicle - Robotic Wingman (RCV-RW)/Automated Convoy Operations (ACO)		-	0.985	2.298

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Description: Robotic Combat Vehicle (RCV) Robotic Wingman (RW)/ Automated Convoy Operations (ACO). RCV-RW is an automated ground combat vehicle system controlled by a command and control vehicle in close proximity and has a three year Science and Technology (S&T) sponsored Joint Capabilities Technology Demonstration (JCTD) starting in FY17. Automated Convoy Operations (ACO) is an advanced modular kit made of sensors and vehicle by-wire control hardware and software, designed to retrofit robotic capabilities onto both medium and heavy legacy Tactical Wheeled Vehicle Fleets. Robotics Development funding helps transition RCV-RW/ACO from S&T projects/demonstrations into program of record phases.</p> <p>FY 2018 Plans: FY 2018 funding supports Systems Engineering, Requirements, Cost Analysis, and Technology Transition Plans.</p> <p>FY 2019 Plans: Funding continues to support Systems Engineering, Requirements, Cost Analysis and Technology Transition Plans, Software Integration Lab (SIL), and Robotic Combat Vehicle - Robotic Wingman (RCV-RW) Joint Capabilities Technology Demonstration (JCTD) transition to Program of Record. This will include cost, schedule and performance risk reduction efforts (e.g. M&S environment development). Funding also supports Squad Multipurpose Equipment Transport (SMET) Modular Mission Payloads (MMP) and Automation Concept Development.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding increased in FY19 to support increased M&S environment capability and support for Robotic Combat Vehicle-Robotic Wingman Joint Capability Technical Demonstration (JCTD).</p>				
<p>Title: Robotic Combat Vehicle ? Experimental Unit Prototypes</p> <p>Description: Robotic Combat Vehicle (RCV) Experimental Unit Prototyping effort will produce purpose built unmanned combat vehicle prototypes with the purpose of creating an experimental unit that Soldiers will use to create new Concepts of Operations (CONOPS), and new requirements for unmanned combat vehicles to support Army Modernization priorities. Effort will leverage a parallel approach to promote multiple industry partners to provide innovative, purpose built unmanned platforms and lethality solutions and conduct a technology rodeo in FY20 of available options. Most promising options will be down-selected to one or potentially more solutions to create a company?s worth (14 RCV platforms with 7 control vehicles) for a 12 month long user evaluation and experimentation starting at the end of FY22. In order to accelerate user involvement with RCV platform capabilities, a parallel risk reduction effort will rapidly prototype surrogate RCV platform using M113 platforms to start initial user evaluations on the surrogate platforms through an Advanced Technology Demonstration (ATD) starting at the end of FY20. Lessons learned from the risk reduction effort will inform development of the purpose built RCV platforms as well as inform the S&T investment to help close gaps identified in unmanned vehicle performance.</p> <p>FY 2019 Plans:</p>		-	-	38.904

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>RCV Risk Reduction effort will install by-wire kits onto M113 vehicles to enable them to be operated remotely. Platforms will be completed by the end of FY19 for integration with autonomy package and follow on shake out testing. The RCV Experimental Unit Prototyping effort will award multiple contracts to industry partners to develop mobility platform demonstrators, remote lethality systems and aided target recognition systems that are high risk subsystems for the RCV prototypes. Contractors will have approximately 18 months to get their systems ready for a system evaluation at the end of FY20. Virtual assessment tools will be used throughout the development process to get contractor designs into a gaming environment for early soldier evaluations and feedback.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Funding increased in FY19 to initiate both the RCV Risk Reduction effort and the Experimental Unit Prototyping effort.</p>			
Accomplishments/Planned Programs Subtotals	-	37.249	92.704

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

N/A

Remarks

Pre-acquisition program activities funded by this line transition to a separate Program Element and Project prior to their first program acquisition Milestone (B or C).

D. Acquisition Strategy

Robotics Development (RD) is designed to facilitate the transition of robotics and autonomous systems technology from Science and Technology (S&T) projects into emerging programs of record. It informs the acquisition process early in the development cycle allowing key stakeholders the ability to make integration decisions and affordability trades while writing requirements.

Tank Automotive Armaments Research Development & Engineering Center (TARDEC) funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology. The Army will build, and test prototype systems for safety release, Soldier use, and further technology maturation.

Product Manager Applique and Large Unmanned Ground Systems (PdM ALUGS) builds upon the TARDEC Expedient Leader Follower (ELF) Operational Technology Demonstration (OTD) to provide a limited autonomous vehicle capability to the Palletized Load System (PLS) A1. Efforts include Capabilities Document input, close monitoring of OTD activities that feed cost estimates, capture technical and test data, provide test support, develop Modeling and Simulation (M&S) capabilities, and develop a Software Integration Lab (SIL).

Automated Convoy Operations (ACO)/ Robotic Combat Vehicle - Robotic Wingman (RCV-RW) funding supports Systems Engineering, Requirements, Cost Analysis, Joint Capabilities Technology Demonstration (JCTD) support, and technology transition plans.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army Date: February 2018

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 4	PE 0604017A / <i>Robotics Development</i>	FD9 / <i>Robotics Systems</i>

Robotic Combat Vehicle (RCV) Experimental Unit Prototyping will provide purpose built unmanned combat vehicles to enable users to assess the capability of the platforms and created new CONOPS and doctrine for manned/unmanned teaming based operations. Efforts will inform new CONOPS, identified system limitations and benefits and provide an achievable, analytically backed basis for future RCV requirements documents to drive future acquisition programs.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
PM FP PdM ALUGS	MIPR	PM FP : Warren, MI	-	-		-		1.025	Nov 2018	-		1.025	0.000	1.025	-
RCIS Type II ALUGS	MIPR	PdM ALUGS : Warren, MI	-	-		-		0.725	Oct 2018	-		0.725	0.000	0.725	-
Subtotal			-	-		-		1.750		-		1.750	0.000	1.750	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Leader Follower Test Assets ALUGS	MIPR	PdM HTV : Warren, MI	-	-		4.874		-		-		-	0.000	4.874	-
RCV-RW M&S SIL ALUGS	MIPR	TARDEC : Warren, MI	-	-		-		1.100	Dec 2018	-		1.100	0.000	1.100	-
SMET Modular Mission Payloads ALUGS	TBD	TBD : TBD	-	-		-		1.000	Dec 2018	-		1.000	0.000	1.000	-
Leader Follower (TARDEC) Tech Demo A Kit	C/CPFF	Robotic Research : Baltimore, MD	-	-		11.000		11.000	Oct 2018	-		11.000	0.000	22.000	-
Leader Follower (TARDEC) Tech Demo B Kit	C/CPFF	Oshkosh : Oshkosh, WI	-	-		10.000		12.500	Dec 2018	-		12.500	0.000	22.500	-
Leader Follower (TARDEC) Integrated System Integrator	C/CPFF	Lockheed Martin : Dallas, TX	-	-		4.500		4.500	Oct 2018	-		4.500	0.000	9.000	-
Leader Follower (TARDEC) Warfighter Machine Interface	C/CPFF	DCS Corp : Boston, MA	-	-		2.500		3.000	Nov 2018	-		3.000	0.000	5.500	-
RCV Risk Reduction Platform Development	TBD	To Be Determined : To Be Determined	-	-		-		11.500	Nov 2018	-		11.500	0.000	11.500	-
RCV Experimental Unit Prototyping Mobility Demonstrators	TBD	To Be Determined : To Be Determined	-	-		-		11.904	Nov 2018	-		11.904	0.000	11.904	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
RCV Experimental Unit Prototyping Lethality Demonstrators	TBD	To Be Determined : To Be Determined	-	-		-		10.000	Nov 2018	-		10.000	0.000	10.000	-
RCV Experimental Unit Prototyping Aided Target Recognition Demonstrators	TBD	To Be Determined : To Be Determined	-	-		-		5.500	Nov 2018	-		5.500	0.000	5.500	-
Subtotal			-	-		32.874		72.004		-		72.004	0.000	104.878	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
PdM ALUGS Support	MIPR	Various : Multiple locations	-	-		2.375		4.750	Oct 2018	-		4.750	0.000	7.125	-
SMET Modular Mission Payloads ALUGS	MIPR	PdM ALUGS : Warren, MI	-	-		-		0.550	Oct 2018	-		0.550	0.000	0.550	-
Technology Demo support (TARDEC)	MIPR	TARDEC : Warren, MI	-	-		1.000		2.100	Oct 2018	-		2.100	0.000	3.100	-
Subtotal			-	-		3.375		7.400		-		7.400	0.000	10.775	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Leader Follower (TARDEC) Tech Demo Testing	MIPR	A TEC : Aberdeen, MD	-	-		0.500		0.200	Oct 2018	-		0.200	0.000	0.700	-
Leader Follower (TARDEC) Tech Demo Data Logger	MIPR	A TEC : Aberdeen, MD	-	-		0.500		0.200	Oct 2018	-		0.200	0.000	0.700	-
Leader Follower (TARDEC) Testing	MIPR	Army Test and Evaluation	-	-		-		10.000	Dec 2018	-		10.000	0.000	10.000	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
LEADER FOLLOWER ALUGS																												
Leader/Follower (LF) Test Preparation Data Collection/Analysis																												
Obtain LF PLS Vehicle Test Assets																												
LF ALUGS MODELING & SIMULATION (M&S)																												
LF M&S Data Source Matrix Development																												
LF M&S Initial Capability Development																												
LF Improve M&S Functionality & increase utility																												
LF M&S continued testing																												
LF M&S Use Case Development																												
LF M&S Validation, Verification Accreditation																												
LF Milestone C Documentation																												
LF MS C																												
LF LRIP																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

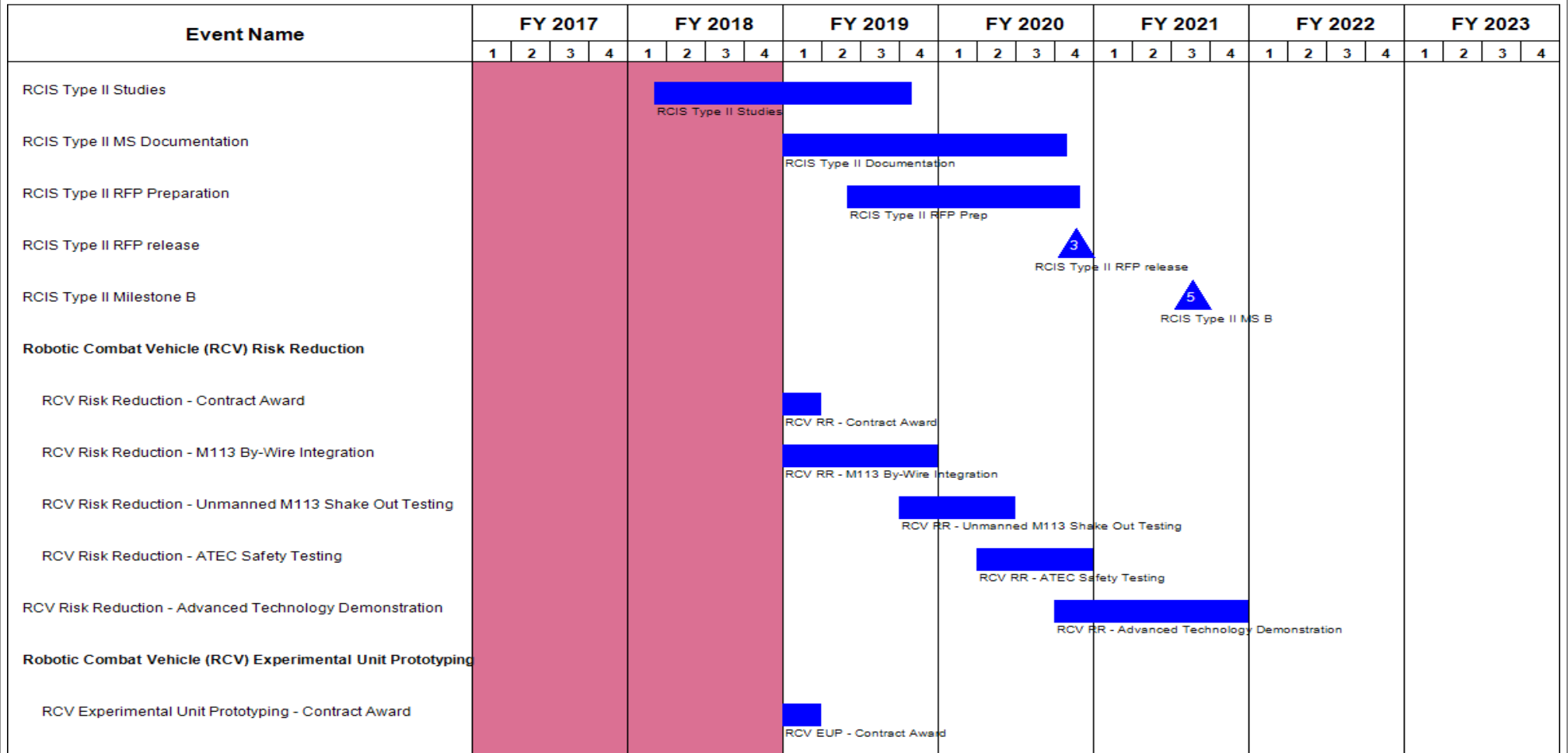
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
ALUGS ROBOTIC WINGMAN(RW)/AUTOMATED CONVOY OPS(ACO)																												
RW/ACO Studies & Analysis Inform Reqts Dev Documentation																												
Robotic Wingman (RW) S&T Sponsored JCTD																												
Robotic Wingman Data Collection																												
TARDEC LEADER FOLLOWER Operational Technology Demonstration (OTD)																												
TARDEC LF Applique Prototype Build (10) for test																												
TARDEC LF Order Items for 140 Applique Systems																												
TARDEC LF Contractor Engineering Test																												
ATEC LF Urgent Material Release (UMR) & Safety Test (TARDEC)																												
TARDEC LF Applique Build (140) for Tech Demo																												
TARDEC LF Urgent Material Release (UMR)																												
TARDEC LF First Unit of Issue																												
TARDEC LF Tech Demo Assessment																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
RCV Experimental Unit Prototyping - Industry Mobility Platform Prototypes																																
RCV EUP - Industry Mobility Platform Prototypes																																
RCV Experimental Unit Prototyping - Industry Lethality Systems Prototypes																																
RCV EUP - Industry Lethality Systems Prototypes																																
RCV Experimental Unit Prototyping - Industry AiTR System Prototypes																																
RCV EUP - Industry AiTR System Prototypes																																
RCV Experimental Unit Prototyping - Prototype Evaluation and Runoff																																
RCV EUP - Prototype Evaluation and Runoff																																
RCV Experimental Unit Prototyping - Down-select Decision																																
RCV EUP - Down-select Decision																																
RCV Experimental Unit Prototyping - Prototype System Integration																																
RCV EUP - Prototype System Integration																																
RCV Experimental Unit Prototyping - Prototype ATEC Safety Test																																
RCV EUP - Prototype ATEC Safety Test																																
RCV Experimental Unit Prototyping - Multiple System Build																																
RCV EUP - Multiple System Build																																
RCV Experimental Unit Prototyping - Operational Technology Demonstration																																
RCV EUP - Operational Technol																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
LEADER FOLLOWER ALUGS	1	2017	4	2022
Leader/Follower (LF) Test Preparation Data Collection/Analysis	1	2017	4	2020
Obtain LF PLS Vehicle Test Assets	1	2018	4	2018
LF ALUGS MODELING & SIMULATION (M&S)	1	2017	4	2020
LF M&S Data Source Matrix Development	1	2017	4	2017
LF M&S Initial Capability Development	4	2017	2	2018
LF Improve M&S Functionality & increase utility	3	2018	4	2020
LF M&S continued testing	2	2018	4	2022
LF M&S Use Case Development	1	2018	1	2019
LF M&S Validation, Verification Accreditation	4	2018	4	2019
LF Milestone C Documentation	3	2019	4	2020
LF MS C	4	2020	4	2020
LF LRIP	1	2021	4	2022
ALUGS ROBOTIC WINGMAN(RW)/AUTOMATED CONVOY OPS(ACO)	1	2017	4	2022
RW/ACO Studies & Analysis Inform Req'ts Dev Documentation	1	2017	4	2022
Robotic Wingman (RW) S&T Sponsored JCTD	4	2017	4	2020
Robotic Wingman Data Collection	3	2021	3	2023
TARDEC LEADER FOLLOWER Operational Technology Demonstration (OTD)	3	2018	3	2022
TARDEC LF Applique Prototype Build (10) for test	3	2018	4	2018
TARDEC LF Order Items for 140 Applique Systems	3	2018	4	2018
TARDEC LF Contractor Engineering Test	3	2018	2	2019
ATEC LF Urgent Material Release (UMR) & Safety Test (TARDEC)	2	2019	3	2020
TARDEC LF Applique Build (140) for Tech Demo	2	2019	4	2019

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / <i>Robotics Development</i>	Project (Number/Name) FD9 / <i>Robotics Systems</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
TARDEC LF Urgent Material Release (UMR)	1	2020	1	2020
TARDEC LF First Unit of Issue	1	2020	1	2020
TARDEC LF Tech Demo Assessment	1	2020	2	2021
RCIS Type II Studies	1	2018	4	2019
RCIS Type II MS Documentation	1	2019	4	2020
RCIS Type II RFP Preparation	2	2019	4	2020
RCIS Type II RFP release	4	2020	4	2020
RCIS Type II Milestone B	3	2021	3	2021
Robotic Combat Vehicle (RCV) Risk Reduction	1	2020	4	2021
RCV Risk Reduction - Contract Award	1	2019	1	2019
RCV Risk Reduction - M113 By-Wire Integration	1	2019	4	2019
RCV Risk Reduction - Unmanned M113 Shake Out Testing	4	2019	2	2020
RCV Risk Reduction - ATEC Safety Testing	2	2020	4	2020
RCV Risk Reduction - Advanced Technology Demonstration	4	2020	4	2021
Robotic Combat Vehicle (RCV) Experimental Unit Prototyping	1	2019	4	2023
RCV Experimental Unit Prototyping - Contract Award	1	2019	1	2019
RCV Experimental Unit Prototyping - Industry Mobility Platform Prototypes	1	2019	4	2020
RCV Experimental Unit Prototyping - Industry Lethality Systems Prototypes	1	2019	4	2020
RCV Experimental Unit Prototyping - Industry AiTR System Prototypes	1	2019	4	2020
RCV Experimental Unit Prototyping - Prototype Evaluation and Runoff	4	2020	1	2021
RCV Experimental Unit Prototyping - Down-select Decision	1	2021	1	2021
RCV Experimental Unit Prototyping - Prototype System Integration	1	2022	2	2022
RCV Experimental Unit Prototyping - Prototype ATEC Safety Test	2	2022	4	2022
RCV Experimental Unit Prototyping - Multiple System Build	1	2022	4	2022
RCV Experimental Unit Prototyping - Operational Technology Demonstration	4	2022	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604020A / CFT Advanced Development & Prototyping
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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	-	0.000	0.000	38.000	-	38.000	174.699	20.735	25.051	25.051	0.000	283.536
CF1: CFT Advanced Development & Prototyping	-	0.000	0.000	38.000	-	38.000	174.699	20.735	25.051	25.051	0.000	283.536

Note

This is a new start for FY19.

A. Mission Description and Budget Item Justification

This Program Element (PE) funds experimental prototyping and technical demonstrations of selected technologies conducted by Cross-Functional Teams (CFT) in order to inform and refine the development of initial capability documents in support of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE). Funding facilitates the experimentation and demonstration of priority technologies to ensure that planned capabilities are technologically feasible, affordable, and available to Soldiers. Benefits include the narrowing of capability gaps by developing capability documents and rapidly transitioning leader-approved capability requirements to the Army Acquisition System. In project CF1, CFT will conduct pre-Materiel Solution Analysis Phase experimentation and technical demonstrations to enable capability document development and improve the decision making for potential programs of record.

This investment support the Chief of Staff of the Army (CSA) six modernization priorities.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	38.000	-	38.000
Total Adjustments	0.000	0.000	38.000	-	38.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	38.000	-	38.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity
2040: *Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)*

R-1 Program Element (Number/Name)
PE 0604020A / *CFT Advanced Development & Prototyping*

Change Summary Explanation
This effort is a new start for FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604020A / CFT Advanced Development & Prototyping				Project (Number/Name) CF1 / CFT Advanced Development & Prototyping			
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
CF1: CFT Advanced Development & Prototyping	-	0.000	0.000	38.000	-	38.000	174.699	20.735	25.051	25.051	0.000	283.536
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This effort is a new start for FY19.

A. Mission Description and Budget Item Justification

This project funds pre-Materiel Solution Analysis Phase experimentation and technical demonstrations conducted by the eight Cross-Functional Teams (CFT) to inform and refine the development of Initial Capability Documents (ICD) to support Materiel Development Decision (MDD) in the areas of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE). CFT advanced development and prototyping efforts will narrow an existing capability gap by informing capability document development and rapidly transition leader-approved capability requirements to the Army Acquisition System. This will allow for faster development of capabilities and ensure planned capabilities are technologically feasible, affordable, and available to the Soldier.

This investment support the Chief of Staff of the Army (CSA) six modernization priorities

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

	FY 2017	FY 2018	FY 2019
Title: CFT Experimental prototyping and technology Demonstration	-	-	38.000
Description: Cross-Functional Teams (CFT) conduct experimental prototyping and technical demonstrations) in order to inform and refine the development of initial capability documents in support of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE).			
FY 2019 Plans: Will conduct experimental prototyping and technical demonstrations to enable the development of Initial Capability Document (ICD) development in support of Enhanced Night Vision Goggles, Enhanced Defense Advanced Global Positioning System			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604020A / <i>CFT Advanced Development & Prototyping</i>	Project (Number/Name) CF1 / <i>CFT Advanced Development & Prototyping</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Receiver (DAGR) Distribution Device, and network and user assessments of Command Post (CP) Mobility and Survivability capabilities. FY 2018 to FY 2019 Increase/Decrease Statement: This is a new start for FY19.				
Accomplishments/Planned Programs Subtotals		-	-	38.000
C. Other Program Funding Summary (\$ in Millions) N/A				
Remarks				
D. Acquisition Strategy Activities will be conducted both in-house and through competitively awarded contracts using best value source selection procedures. Multiple competitive contracts will be awarded.				
E. Performance Metrics N/A				

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604020A / CFT Advanced Development & Prototyping	Project (Number/Name) CF1 / CFT Advanced Development & Prototyping	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Cross Functional Teams									Advanced development and prototyping																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604020A / <i>CFT Advanced Development & Prototyping</i>	Project (Number/Name) CF1 / <i>CFT Advanced Development & Prototyping</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Cross Functional Teams	1	2019	2	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604100A / <i>Analysis Of Alternatives</i>
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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	-	6.354	9.921	9.765	-	9.765	10.023	10.092	10.225	10.427	0.000	66.807
EC7: <i>Analysis Of Alternatives</i>	-	6.354	9.921	9.765	-	9.765	10.023	10.092	10.225	10.427	0.000	66.807

A. Mission Description and Budget Item Justification

This PE provides funding for analytical support of Analysis of Alternatives (AoA). Based on Department of Defense Instruction (DoDI) 5000.02, AoAs are required to be completed for a new start program prior to its first Milestone (MS) Decision. AoAs are a statutory requirement for ACAT I programs and regulatory for ACAT II and ACAT III programs. The AoAs support the preparation of the Capability Development Document (CDD), Key Performance Parameters (KPP) and Thresholds within the CDDs and tradeoff analysis. The Army must complete an AoA prior to the MS A Decision in order to successfully achieve a MS A decision for new start programs. For new start programs which do not yet have a Program Manager assigned this PE provides central funding prior to a materiel development decision. The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy and Plan. Work in this PE is performed by analytical agencies such as U.S. Army TRADOC Analysis Center and U.S. Army Materiel Systems Analysis Activity. The Army is projecting to start work on multiple AoAs beginning in FY 2019, and will assess and fund the highest Army priorities during the year of execution.

B. Program Change Summary (\$ in Millions)

	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>
Previous President's Budget	6.608	9.921	9.870	-	9.870
Current President's Budget	6.354	9.921	9.765	-	9.765
Total Adjustments	-0.254	0.000	-0.105	-	-0.105
• Congressional General Reductions	-0.003	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.251	-			
• Adjustments to Budget Years	-	-	-0.105	-	-0.105

Change Summary Explanation

FY 2017 adjustments include \$-0.003 million for FFRDC, \$-0.220 million for SBIR and \$-0.031 million for STTR.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604100A / <i>Analysis Of Alternatives</i>				Project (Number/Name) EC7 / <i>Analysis Of Alternatives</i>			
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
EC7: <i>Analysis Of Alternatives</i>	-	6.354	9.921	9.765	-	9.765	10.023	10.092	10.225	10.427	0.000	66.807
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This PE provides funding for analytical support of Analysis of Alternatives (AoA). Based on Department of Defense Instruction (DoDI) 5000.02, AoAs are required to be completed for a new start program prior to its first Milestone (MS) Decision. AoAs are a statutory requirement for ACAT I and ACAT II programs and regulatory for ACAT III programs. The AoAs support the preparation of the Capability Development Document (CDD), Key Performance Parameters (KPP) and Thresholds within the CDDs and tradeoff analysis. The Army must complete an AoA prior to the MS A Decision in order to successfully achieve a MS A decision for new start programs. For new start programs which do not yet have a Program Manager assigned this PE provides central funding prior to a materiel development decision. The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy and Plan. Work in this PE is performed by analytical agencies such as U.S. Army TRADOC Analysis Center and U.S. Army Materiel Systems Analysis Activity. The Army is projecting to start work on multiple AoAs beginning in FY 2019, and will assess and fund the highest Army priorities during the year of execution.

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

	FY 2017	FY 2018	FY 2019
Title: Analysis of Alternatives	6.354	9.921	9.765
<p>Description: This PE provides funding for analytical support of Analysis of Alternatives (AoA). Based on Department of Defense Instruction (DoDI) 5000.02, AoAs are required to be completed for a new start program prior to its first Milestone (MS) Decision. AoAs are a statutory requirement for ACAT I programs and regulatory for ACAT II and ACAT III programs. The AoAs support the preparation of the Capability Development Document (CDD), Key Performance Parameters (KPP) and Thresholds within the CDDs and tradeoff analysis. The Army must complete an AoA prior to the MS A Decision in order to successfully achieve a MS A decision for new start programs. For new start programs which do not yet have a Program Manager assigned this PE provides central funding prior to a materiel development decision. The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy and Plan. Work in this PE is performed by analytical agencies such as U.S. Army TRADOC Analysis Center and U.S. Army Materiel Systems Analysis Activity. The Army is projecting to start work on Multiple AoAs beginning in FY 2019, and will assess and fund the highest Army priorities during the year of execution.</p>			
<p>FY 2018 Plans: FY 2018 PE funds are planned to support AoAs for new program starts that require a materiel development decision. Funding will support new programs including Maneuver SHORAD, Enhanced Heavy Equipment Transport System, Terrestrial Layer Intelligence Support for Multi-Domain Battle/Joint Combined Arms Maneuver, Future Vertical Lift Capability Set 3, Family of Unmanned Aircraft Systems, Vehicle Protection Suite, and Advanced Threat Detection System. Funding will also support</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604100A / <i>Analysis Of Alternatives</i>	Project (Number/Name) EC7 / <i>Analysis Of Alternatives</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>finalizing FY 2017 analysis efforts on programs including Next Generation Biometric Collection Capability, Mobile Protected Firepower, and Degraded Visual Environment.</p> <p><i>FY 2019 Plans:</i> FY 2019 funding in the amount of \$9.765 million supports Analysis of Alternatives (AoA) for new start programs that do not yet have a Program Manager assigned and to augment PM funds where requirement decisions drive changes in scope or increased fidelity to achieve Congressional intent and interest. AoA initiation, scope, and fidelity are determined through the AROC process prior to the materiel development decision. Current projections indicate multiple new start programs will need to start their AoA in FY 2019, including Unified Network Operations, Common Operating Environment, Cyberspace Situational Understanding, Offensive Cyberspace Operations, Mobile Armored Combat Earthmover, and Synthetic Training Environment. In addition, several AoA started in FY 2018 will continue to require analysis funding into FY 2019, to include Vehicle Protection Suite, Terrestrial Layer Intelligence Support for Multi-Domain Battle/Joint Combined Army Maneuver, Future Tactical Unmanned Aircraft System, and Advanced Threat Detection System. In the Spring of 2018 (on or about 1 May) we will provide the Committee an updated listing of projected FY 2019 new start program AoAs.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> The decrease in funding is attributed to economic adjustments.</p>			
Accomplishments/Planned Programs Subtotals	6.354	9.921	9.765

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

N/A

Remarks

Not applicable for this item.

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604100A / <i>Analysis Of Alternatives</i>	Project (Number/Name) EC7 / <i>Analysis Of Alternatives</i>
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Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Identify Candidates for FY19 AoA funding																												
Issue FY19 AoA Funding																												
Identify Candidates for FY18 AoA funding																												
Issue FY18 AoA Funding																												
Conduct Analysis of Alternatives																												
Identify Candidates for FY20 AoA funding																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604100A / <i>Analysis Of Alternatives</i>	Project (Number/Name) EC7 / <i>Analysis Of Alternatives</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Identify Candidates for FY19 AoA funding	4	2018	3	2019
Issue FY19 AoA Funding	1	2019	4	2019
Identify Candidates for FY18 AoA funding	4	2017	3	2018
Issue FY18 AoA Funding	1	2018	4	2018
Conduct Analysis of Alternatives	1	2018	4	2020
Identify Candidates for FY20 AoA funding	4	2019	3	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>
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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	-	0.000	0.000	12.393	-	12.393	5.645	3.751	3.881	0.160	0.000	25.830
EX8: <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	-	0.000	0.000	12.393	-	12.393	5.645	3.751	3.881	0.160	0.000	25.830

Note

Future Tactical Unmanned Aircraft System (FTUAS) is a new start program.

A. Mission Description and Budget Item Justification

The Future Unmanned Aircraft System (FUAS) is a critical system in the multi-domain battle concept that will employ cross-domain capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders.

Future Tactical Unmanned Aircraft System (FTUAS) is a new start program. To fully enable these desired cross-domain capabilities, FTUAS will leverage universal and scalable control interfaces and plug-and-play, advanced payloads to optimize manned-unmanned teaming for air and ground maneuver units across all environments. These systems will employ multi-domain capabilities increasing the Army's ability to generate overmatch, provide the ground commander with multiple options, and enable joint force freedom of maneuver. Key attributes of the FTUAS include: (1) Reach: Expeditionary maneuver and mobility through increased speed, range, endurance, and payload capacity; (2) Protection: The capability and capacity to operate across a wider depth and breadth of domains, including high threat and denied environments, with assured communications, navigation, and reduced visual, electronic, and audio signatures able to overcome enemy countermeasures in high threat, anti-access and area denial (A2AD) environments; and (3) Lethality: A broad range of sensors and cross-domain fires that increase the speed of detecting, acquiring, identifying, and prioritizing targets to suppress, neutralize, and destroy enemy forces.

FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including take-off and landing systems, power generation, transportation, or unique command and control equipment; aircraft software; and required engineering, logistics, and programmatic support.

The Material Development Decision (MDD) for FTUAS is planned for FY21 followed by a 12 month Analysis of Alternatives (AoA). At the end of the AoA phase TRAC Leavenworth will present findings and conclusions based on the collected and analyzed data. FTUAS will be prepared to proceed to the appropriate acquisition milestone based on Army's decision.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	12.393	-	12.393
Total Adjustments	0.000	0.000	12.393	-	12.393
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	12.393	-	12.393

Change Summary Explanation

Addition of \$12.393 will provide required support for FTUAS pre-milestone decision requirements such as: MDTF Experimentation, market research, Validated On-line Threat (VOLT) Assessment, Analysis of Alternatives (AoA), independent cost estimates and other required milestone documents.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>				Project (Number/Name) EX8 / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>			
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
EX8: <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	-	0.000	0.000	12.393	-	12.393	5.645	3.751	3.881	0.160	0.000	25.830
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Future Tactical Unmanned Aircraft System (FTUAS) is a new start program.

A. Mission Description and Budget Item Justification

The Future Unmanned Aircraft System (FUAS) is a critical system in the multi-domain battle concept that will employ cross-domain capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders.

Future Tactical Unmanned Aircraft System (FTUAS) is a new start program. To fully enable these desired cross-domain capabilities, FTUAS will leverage universal and scalable control interfaces and plug-and-play, advanced payloads to optimize manned-unmanned teaming for air and ground maneuver units across all environments. These systems will employ multi-domain capabilities increasing the Army's ability to generate overmatch, provide the ground commander with multiple options, and enable joint force freedom of maneuver. Key attributes of the FTUAS include: (1) Reach: Expeditionary maneuver and mobility through increased speed, range, endurance, and payload capacity; (2) Protection: The capability and capacity to operate across a wider depth and breadth of domains, including high threat and denied environments, with assured communications, navigation, and reduced visual, electronic, and audio signatures able to overcome enemy countermeasures in high threat, anti-access and area denial (A2AD) environments; and (3) Lethality: A broad range of sensors and cross-domain fires that increase the speed of detecting, acquiring, identifying, and prioritizing targets to suppress, neutralize, and destroy enemy forces.

FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including take-off and landing systems, power generation, transportation, or unique command and control equipment; aircraft software; and required engineering, logistics, and programmatic support.

The Material Development Decision (MDD) for FTUAS is planned for FY21 followed by a 12 month Analysis of Alternatives (AoA). At the end of the AoA phase TRAC Leavenworth will present findings and conclusions based on the collected and analyzed data. FTUAS will be prepared to proceed to the appropriate acquisition milestone based on Army's decision.

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




	FY 2017	FY 2018	FY 2019
Title: System Engineering/Program Management	-	-	1.593
Description: System Engineering and Program Management			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	Project (Number/Name) EX8 / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p><i>FY 2019 Plans:</i> Funding for System Engineering/Program Management (SEPM) to support FTUAS pre-milestone decision requirements such as: MDTF Experimentation, market research, Validated On-line Threat (VOLT) Assessment, Analysis of Alternatives (AoA), independent cost estimates and other required milestone documents.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Future Tactical Unmanned Aircraft System (FTUAS) is a new start program.</p>				
<p><i>Title:</i> Multi Domain Task Force (MDTF) Experimentation</p> <p><i>Description:</i> FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including take-off and landing systems, power generation, transportation, or unique command and control equipment; aircraft software; and required engineering, logistics, and programmatic support</p> <p><i>FY 2019 Plans:</i> Funding for USARPAC Multi-Domain Task Force (MDTF) Experimentation supports UAS aircraft, payload and Multi-Function Electronic Warfare (MFEW) experimentation which will inform FTUAS requirements and Analysis of Alternatives (AoA).</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Future Tactical Unmanned Aircraft System (FTUAS) is a new start program.</p>		-	-	10.800
Accomplishments/Planned Programs Subtotals		-	-	12.393
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
TRADOC System Manager - Recon Attack (TCM-RA) has prepared an Initial Capabilities Document (ICD) that will go to AROC at the next available opportunity. PM TUAS will immediately follow that with an MDD and an AoA phase.				
E. Performance Metrics				
On time delivery of required documents in support of MDD and subsequent milestones including Affordability Analysis, AoA Study Guidance and AoA Study Plan, market research, Validated On-line Threat (VOLT) Assessment, AoA, independent cost estimates and other required milestone documents.				

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	Project (Number/Name) EX8 / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Multi Domain Task Force Experimentation (MDTF)																												
System Engineering/Program Management (SEPM)																												
Materiel Development Decision																												
																												
Analysis of Alternatives																												
Milestone A/B/C																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	Project (Number/Name) EX8 / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Multi Domain Task Force Experimentation (MDTF)	1	2019	4	2020
System Engineering/Program Management (SEPM)	1	2019	4	2023
Materiel Development Decision	1	2021	1	2021
Analysis of Alternatives	2	2021	2	2022
Milestone A/B/C	3	2022	3	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Missile Defense (LTAMD) Capability</i>							
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	-	33.780	76.728	120.374	-	120.374	125.772	376.738	332.322	241.461	Continuing	Continuing
<i>EX2: Lower Tier Air Missile Defense (LTAMD) Capability</i>	-	33.780	76.728	120.374	-	120.374	125.772	376.738	332.322	241.461	Continuing	Continuing

Note

Starting in FY17, funding realigned from PE 0607865A, PATRIOT Product Improvement (Project DV8).

A. Mission Description and Budget Item Justification

Lower Tier Air Missile Defense (LTAMD) Capability program will provide the required sensing capabilities in the lower tier portion of the ballistic missile defense battlespace. The acquisition program will competitively select the sensor/radar set (RS) to replace the baseline PATRIOT RS (AN/MPQ-65A) due to threat changes and the growing obsolescence and high Operational & Support (O&S) cost of the existing RS. The LTAMD Capability will address critical capability gaps, modernize technology, reduce O&S costs, mitigate obsolescence, and increase reliability and maintainability. The LTAMD Capability will increase sensor/radar performance to maximize the inherent PAC-3 Missile Segment Enhanced (MSE) Interceptor capabilities to engage threats.

Lower Tier Air Missile Defense (LTAMD) Capability tasks include the programmatic and engineering activities needed for LTAMD-Capability post Milestone A activities, and preparation required to execute the competitive Technology Maturation and Risk Reduction (TMRR) agreement. Once proposed TMRR materiel solutions have been evaluated, the development effort for LTAMD Capability will continue into the Engineering and Manufacturing Development (EMD) phase to enable the prototyping, development, and testing of the LTAMD Capability.

FY2019 base dollars in the amount of \$120.374 million continues Lower Tier Missile Defense Capability to include programmatic and engineering activities needed for TMRR activities described above.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Missile Defense (LTAMD) Capability</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	35.132	76.728	67.088	-	67.088
Current President's Budget	33.780	76.728	120.374	-	120.374
Total Adjustments	-1.352	0.000	53.286	-	53.286
• Congressional General Reductions	-0.017	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.335	-			
• Adjustments to Budget Years	-	-	53.286	-	53.286

Change Summary Explanation

Funding increase of \$53.286M in FY19 is in support of the Army's Missile Defense modernization priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Missile Defense (LTAMD) Capability</i>				Project (Number/Name) EX2 / <i>Lower Tier Air Missile Defense (LTAMD) Capability</i>			
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
<i>EX2: Lower Tier Air Missile Defense (LTAMD) Capability</i>	-	33.780	76.728	120.374	-	120.374	125.772	376.738	332.322	241.461	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Lower Tier Air and Missile Defense Sensor (LTAMDS) satisfies the Warfighter's capability requirements in the integrated air and missile defense domain. The program provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the Patriot Advanced Capability (PAC-3) Missile Segment Enhancement (MSE) interceptor. The Army Requirements Oversight Council (AROC) approved LTAMDS requirements in April 2016. The Fires Center of Excellence (FCoE) draft LTAMDS Capability Development Document (CDD) synchronizes Warfighter needs with AROC-approved requirements.

LTAMDS will competitively select the sensor/radar set (RS) to replace the baseline PATRIOT RS (AN/MPQ-65A) to address emerging advances in threat systems, which, coupled with the growing obsolescence and high operations & support (O&S) costs of the current lower tier sensor, drives a materiel solution. Consequently, the collective purpose of LTAMDS is to address critical capability gaps using state of the art technology, reduce O&S costs, mitigate obsolescence, and increase reliability & maintainability (R&M).

LTAMDS FY2019 funding requirements include continuation of incremental funding up to three contractors conducting engineering and prototyping activities to integrate components into the next higher assembly (known as Line Replaceable Unit (LRU)), and Government/Other Transaction Agreement (OTA) knowledge point and functional reviews of vendors' prototypes. Additionally, LTAMDS will initiate programmatic and contracting efforts for the development of the Engineering and Manufacturing Development (EMD) phase. Additional funding allows early software design development and the beginning of software testing.

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

	FY 2017	FY 2018	FY 2019
Title: Lower Tier Missile Defense Sensor	33.780	76.728	120.374
Description: Provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the Patriot Advanced Capability (PAC-3) Missile Segment Enhancement (MSE) interceptor.			
FY 2018 Plans:			
- Conducted LTAMDS programmatic and engineering activities needed for Technology Maturity and Risk Reduction (TMRR) phase			
- Conducted Milestone A Defense Acquisition Board (DAB)			
- Completed Concept Definition activities and component level knowledge point evaluations			
- Awarded Defense Ordnance Technology Consortium (DOTC) TMRR contract agreements			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Missile Defense (LTAMD) Capability</i>	Project (Number/Name) EX2 / <i>Lower Tier Air Missile Defense (LTAMD) Capability</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
- Continued refinement of LTAMDS System Performance Specification			
<i>FY 2019 Plans:</i>			
- Conduct LTAMDS Technology Maturation and Risk Reduction (TMRR) phase vendor engineering and prototyping activities to integrate components into the next higher assembly (known as the Line Replaceable Unit --LRU).			
- Conduct Department of Defense Ordnance Technology Consortium (DOTC) TMRR knowledge point and functional reviews of vendor's prototypes.			
- Begin Engineering and Manufacturing Development (EMD) contract planning.			
- With additional funding, conduct engagements with industry to enable further software development and design concepts to accelerate capability.			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i>			
Increase in funding allows early software design development and the beginning of software testing. Utilizing additional funding allows the Army to be better informed enabling acceleration of capability.			
Accomplishments/Planned Programs Subtotals	33.780	76.728	120.374

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• DV8: <i>Patriot Product Improvement</i>	48.073	90.217	65.369	-	65.369	42.803	61.495	78.745	94.510	0.000	481.212

Remarks

D. Acquisition Strategy

To enhance the Warfighter's lethality, survivability, and combat effectiveness, the Army is using the Department of Defense Ordnance Technology Consortium Other Transaction Agreement (DOTC OTA) for Concept Definition (CD) efforts. Based on CD results, the Army plans to continue using the DOTC OTA process to conduct TMRR activities. DOTC OTA promotes non-traditional contractor involvement, accelerates schedule, provides early government-contractor dialogue, provides detailed contractor cost and schedule estimates, verifies industry readiness, and informs the Milestone Decision Authority (MDA) on materiel solutions and design concepts for milestone events.

Since this time last year, engagements with industry have enabled refinement of the schedule to accelerate capability. Utilizing DOTC contract agreements with four consortium members has better informed the Army. Through this refinement and agreement the net effect is acceleration of schedule and capability.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army Date: February 2018

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 4	PE 0604114A / Lower Tier Missile Defense (LTAMD) Capability	EX2 / Lower Tier Air Missile Defense (LTAMD) Capability

The LTAMDS program will pursue a competitive approach that delivers the best materiel solution to meet LTAMDS performance requirements within cost and schedule. Using the DOTC process, the Army competitively selected four contractors for CD and will select up to three contractors for TMRR. Leading up to MS B, the Army will explore the continued use of OTAs to select a single contractor for EMD.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / Lower Tier Missile Defense (LTAMD) Capability	Project (Number/Name) EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Government Program Management	MIPR	Various : Redstone Arsenal, AL	-	6.285	Oct 2016	3.515	Oct 2017	4.515	Oct 2018	-		4.515	Continuing	Continuing	-
Systems Engineering and Technical Assistance (SETA)	Various	Systems Engineering and Technical Assistance : Huntsville, AL	-	3.000	Oct 2016	5.000	Oct 2017	5.000	Oct 2018	-		5.000	Continuing	Continuing	-
Subtotal			-	9.285		8.515		9.515		-		9.515	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Technical Maturation and Risk Reduction (TMRR)	C/TBD	TBD : TBD	-	-		12.197	Jul 2018	96.759	Mar 2019	-		96.759	Continuing	Continuing	-
Concept Definition	C/CPFF	Raytheon, Lockheed Martin, Technovative Applications, Northrop Grumman : Andover MA; Liverpool NY; Brea CA; Linthicum MD	-	24.495	Aug 2017	47.416	Mar 2018	-		-		-	0.000	71.911	-
Product Development Support	C/TBD	TBD : TBD	-	-		-		3.000	Oct 2018	-		3.000	0.000	3.000	-
Subtotal			-	24.495		59.613		99.759		-		99.759	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Test Planning/Targets/Interceptors/U.S. Other Government Agencies (OGAs)	MIPR	RDEC, SED, WSMR-T&E Support : Huntsville, AL; White Sands, NM	-	-		8.600	Jan 2018	11.100	Jan 2019	-		11.100	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / Lower Tier Missile Defense (LTAMD) Capability	Project (Number/Name) EX2 / Lower Tier Air Missile Defense (LTAMD) Capability

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
Concept Definition					[Redacted]																											
Milestone A									1 MS A																							
Technology Maturation and Risk Reduction									[Redacted]																							
TMRR Contract Award									2 TMRR CA																							
Preliminary Design Review																	3 PDR															
Hardware/Software Evaluation																	[Redacted]															
Milestone B																									5 MS B							
Engineering and Manufacturing Development																									[Redacted]							
Critical Design Review																					4 CDR											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Missile Defense (LTAMD) Capability</i>	Project (Number/Name) EX2 / <i>Lower Tier Air Missile Defense (LTAMD) Capability</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Concept Definition	4	2017	4	2018
Milestone A	3	2018	3	2018
Technology Maturation and Risk Reduction	3	2018	3	2022
TMRR Contract Award	3	2018	3	2018
Preliminary Design Review	2	2020	2	2020
Hardware/Software Evaluation	2	2020	1	2021
Milestone B	3	2022	3	2022
Engineering and Manufacturing Development	3	2022	4	2024
Critical Design Review	2	2021	2	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>
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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	-	57.737	115.221	95.347	-	95.347	99.584	106.102	109.471	111.610	0.000	695.072
DS3: <i>TECHNOLOGY MATURATION INITIATIVES</i>	-	43.314	115.221	95.347	-	95.347	99.584	106.102	109.471	111.610	0.000	680.649
EX3: <i>Ground Vehicle Prototyping</i>	-	14.423	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.423

A. Mission Description and Budget Item Justification

This Program Element (PE) funds experimental prototyping and demonstration of selected technology enabled capabilities to support advanced ground systems, aviation systems, command, control, communications & reconnaissance systems and equipment, precision weapons, High Energy Laser (HEL) systems, and Soldier equipment. Funding facilitates maturation and demonstration of advanced technologies and systems in relevant environments and tactical/operational scenarios, as well as the maturation and demonstration of a robust Virtual Proving Ground (VPG) for rapid, accurate, and computational prototyping of major Army platforms. Benefits include maturing technologies to a goal of Technology Readiness Level (TRL) 7, informing emerging requirements for future programs of record, and reducing technology risk in order to transition of leap-ahead capabilities into acquisition programs. In Project DS3, Technology Maturation Initiative efforts mature and integrate advanced component technologies into system and sub-system technology demonstrators and experimental prototypes, which are then validated and transitioned to priority Army experimentation efforts and programs of record. Computational Prototyping Environment (CPE) efforts include demonstration of physics-based, computational modeling integrated with new advances in deep learning to explore design tradespaces and understand defeat strategies for prototype platforms. Project EX3 funds experimental prototyping and demonstration of ground vehicles to assess future concepts and designs against selected capability trades, and emerging technologies for current and future combat vehicles across the combat vehicle portfolio. This PE provides the Army an improved mechanism for enabling greater competition in the latter stages of technology maturation and establishes a closer alignment between Science and Technology (S&T) efforts and acquisition programs. Efforts in this PE support the Cross-Functional Teams established by the Army to speed materiel development activities in support of the Army Modernization Priorities.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering S&T priority focus areas and the Army Modernization Strategy. This investment supports the Army Modernization priorities, including future capability opportunities for the Network, Next Generation Combat Vehicle, and Air and Missile Defense.

Work in this PE is performed by Research, Development and Engineering Command (RDECOM), the Engineer Research Development Center (ERDC), and US Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	70.047	115.221	96.372	-	96.372
Current President's Budget	57.737	115.221	95.347	-	95.347
Total Adjustments	-12.310	0.000	-1.025	-	-1.025
• Congressional General Reductions	-0.029	-			
• Congressional Directed Reductions	-10.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.281	-			
• Adjustments to Budget Years	-	-	-1.025	-	-1.025

Change Summary Explanation

FY2017 Congressional Directed Reduction to Project EX3, Ground Vehicle Prototyping.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>					Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>		
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
DS3: <i>TECHNOLOGY MATURATION INITIATIVES</i>	-	43.314	115.221	95.347	-	95.347	99.584	106.102	109.471	111.610	0.000	680.649
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

N/A

A. Mission Description and Budget Item Justification

This Project funds the maturation, integration, and demonstration of advanced technology demonstrators and experimental prototypes to support advanced ground systems; aviation systems; command, control, communication & reconnaissance systems and equipment; precision weapons, High Energy Laser (HEL) systems; and Soldier equipment. Technology Maturation Initiative (TMI) efforts mature and integrate component technologies into early system and sub-system experimental prototypes for demonstration in relevant environments and tactical/operational scenarios, taking technologies to a goal of Technology Readiness Level (TRL) 7. Technology demonstrators and experimental prototypes are validated and transitioned to priority Army experimentation and acquisition efforts to inform requirements for future programs of record and reduce the risk of technology insertion. These efforts are typically 2-4 years in duration, and are approved by Army senior leadership based on priority and opportunity, to ensure that demonstrations have high potential for filling capability gaps and transitioning. Activities include the maturation, integration, and demonstration of HEL prototype weapons performance on a combat platform in realistic operational environments, in support of the Army's objective capability for Maneuver-Short Range Air Defense (M-SHORAD). A 50 kW-class laser weapon system has the potential to engage and defeat rockets, artillery, mortars (RAM), unmanned aerial vehicles (UAVs), sensors, and optics for maneuvering brigade combat teams (BCTs). Activities also include sub-system prototyping and integration of leap-ahead ground combat vehicle powertrain technologies; and integration and demonstration of key Active Protection System (APS) components to provide modular and layered vehicle protection effects (hard-kill and soft-kill), enabling power projection and enhanced survivability. Computational Prototyping Environment (CPE) efforts include demonstration of physics-based, computational modeling integrated with new advances in deep learning to explore design tradespaces and understand defeat strategies for prototype platforms. This Project provides the Army an improved mechanism for enabling greater competition in the latter stages of technology maturation and establishing a closer alignment between Science and Technology (S&T) efforts and acquisition programs.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering S&T priority focus areas and the Army Modernization Strategy. This investment supports the Army Modernization priorities, including future capability opportunities for the Network, Next Generation Combat Vehicle, and Air and Missile Defense.

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

	FY 2017	FY 2018	FY 2019
Title: Maturation and Prototyping for Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) Systems	8.834	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Description: This effort selects technologies that show high promise for advancing command, control, communication and reconnaissance capabilities required under acquisition programs; prototypes, evaluates, and demonstrates integrated technologies within a high fidelity and realistic operating environment, and transitions them to a formal program of record at reduced cost and/or risk.</p>				
<p>Title: Vehicle Survivability Subsystem Demonstrator</p> <p>Description: The Vehicle Survivability Subsystem effort integrates and demonstrates cost effective, lightweight designs for the optimization of hull, frame, body, cab and armor technologies to achieve survivability systems weight reductions of 10-15% and increased vehicle survivability against advanced and emerging threats. This effort is coordinated with efforts in PE 0603005A.</p> <p>FY 2018 Plans: Leverage the data from the previous year testing to integrate lessons learned while fabricating and integrating advanced components and optimized subsystems for a survivability demonstrator, targeting tracked combat vehicles with limited ground standoff. Integrate matured blast components & subsystems for demonstrator testing, to include: armor, advanced energy absorbing (EA) floors, adjustable EA seats, lighter weight hull with same or better protection levels. Optimize the number and placement of active blast mitigation system countermeasures into a blast demonstrator for underbody blast and structural evaluation. Perform design optimization of the survivability demonstrator for Fiscal Year (FY) 2019.</p> <p>FY 2019 Plans: Will complete design optimization of the integrated survivability demonstrator to prepare for system level durability and blast testing, achieving survivability systems weight reductions and increasing survivability against advanced and emerging threats. Will integrate passive blast technologies and active blast mitigation system countermeasures into a demonstrator for underbody blast and structural evaluation. Will conduct durability and blast testing to demonstrate the performance of integrated blast components, including surrogate armor, active blast mitigation, advanced energy absorbing (EA) floors, adjustable EA seats and restraints, and lighter weight hull with same or better levels of protection.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Planned progression of the Vehicle Survivability Subsystem Demonstrator effort.</p>		9.779	10.271	7.650
<p>Title: Advanced Powertrain Subsystem Demonstrator</p> <p>Description: The Advanced Powertrain Subsystem Demonstrator effort fabricates, integrates, and demonstrates next generation, scalable combat vehicle powertrain technologies into a high power dense and more fuel efficient combat vehicle powertrain. This powertrain will demonstrate advancements in engine and transmission subsystem components specific for military platforms in order to provide an integrated advanced propulsion system . This effort is coordinated with efforts in PE 0603005A.</p>		9.142	12.950	11.018

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p><i>FY 2018 Plans:</i> Integrate the major subsystem to include the multi-cylinder engine and the advanced high efficient transmission as part of the overall advanced powertrain demonstrator integration. As part of the subsystem integration, verify and validate a functional opposed-piston, multi-cylinder engine that is operationally mated to a high efficiency, cross drive transmission (to include steering and braking) to support military tracked vehicles. The technology is being developed for future military vehicle application such as the Bradley Family of Vehicles and future fighting vehicles.</p> <p><i>FY 2019 Plans:</i> Will build upon and add components to the major subsystem integration of the multi-cylinder engine and the advanced high efficiency transmission, as part of the overall advanced powertrain demonstrator integration. Will verify and validate that all components function as expected. Using a reduced risk strategy, will mature and demonstrate high power-density and more fuel efficient integrated powertrain to support military tracked vehicles. Will optimize system controls to improve performance for a wide range of powertrain applications. The technology is being developed for future military vehicle application such as the Bradley Family of Vehicles and future infantry vehicles.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Planned progression of the Advanced Powertrain Subsystem Demonstrator effort.</p>				
<p><i>Title:</i> Modular Active Protection System (MAPS) Demonstration</p> <p><i>Description:</i> This effort conducts Active Protection System (APS) component and subsystem technology maturation and adaption, aligned with Survivability Sets 1, 2, and 3, as well as Expedited APS activity, to increase component reliability, comply with the Army's modular approach to active protection, and resolve component integration challenges. It integrates subsystem technology demonstrators and conducts demonstrations of soft-kill and hard-kill APS capability to verify APS performance within the modular and safe design approach, and to reduce technical risk for APS transition for the current and future combat and tactical vehicle platforms.</p> <p><i>FY 2018 Plans:</i> Complete build of soft-kill/hard-kill Modular APS Controller subsystem technology demonstrator and demonstrate in a relevant environment. Implement Modular APS framework for Survivability Set 1 (SS1) capabilities, including passive threat sensing (i.e., laser warning receiving and passive infrared (IR) cue) and smoke technologies; mature Modular APS framework for Survivability Set 2 (SS2) soft-kill capabilities, including passive threat sensing, smoke, and countermeasure technologies. Continue evaluation of APS installation on current Army Abrams, Bradley, and Stryker platforms.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i></p>		15.559	9.000	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Planned progression of the MAPS Demonstration effort, which concludes in FY2018.				
<p>Title: Active Protection Systems (APS) Integration and Demonstration</p> <p>Description: This effort will synchronize emerging S&T products with the Vehicle Protection Suite (VPS) Program of Record and will mature key Active Protection System (APS) technologies to a Technology Readiness Level 7 for integration onto current and future ground platforms. It will mature Modular Active Protection Framework (MAF)-compliant effectors and sensors and integrate them onto ground combat vehicles for prototype system test and demonstration. It will conduct independent evaluation to inform system development processes that ensure safety compliance for future VPS increment upgrades as new threats emerge.</p> <p>FY 2019 Plans: Will conduct system-level testing of the Modular Active Protection Framework and Controller base-kit. Will determine best candidate APS effector and sensor technologies that are MAF-compliant for system-level integration and validation. Will begin system-level integration of selected APS effector and sensor technologies on desired combat platform prototypes.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Planned FY19 Active Protection System Integration and Demonstration effort. This effort addresses the Army Modernization priorities for Next Generation Combat Vehicle.</p>		-	-	7.695
<p>Title: Multi-Mission High Energy Laser (MMHEL)</p> <p>Description: This effort matures and integrates a 50 kW-class laser system into a Stryker platform, providing a system-level, High Energy Laser (HEL) experimental prototype for demonstration in realistic operating environments. These demonstrations will inform requirements, decrease risk for future Army HEL acquisition programs, and support the future development of warfighter Tactics/Techniques/Procedures (TTPs) and Concept of Operations (CONOPS). HEL weapon systems are expected to complement conventional offensive and defensive weapons at a lower cost-per-shot than current systems and without the need to stockpile ordnance. A 50 kW-class laser weapon system has the potential to engage and defeat rockets, artillery, mortars (RAM); UAVs; sensors; and optics for maneuvering BCTs. Demonstrations will also inform potential future capability to defeat both fixed- and rotary-wing manned aircraft. Leveraging Government investments and Industry technology advancements, will review and select existing HEL subsystem designs for integration into a Stryker vehicle; will conduct integration and demonstration of a system-level HEL experimental prototype; and will provide assessment of technical performance in an operational environment.</p> <p>FY 2018 Plans: Establish government/industry teams for execution of the MMHEL effort. Leveraging previous advanced technology development and risk-reduction activities, update and review existing 50kW-class laser subsystem designs and interfaces for integration into a Stryker vehicle (including laser, beam control, power, thermal management, and Army Battle Management Command, Control, and Computers (BMC3) architecture). Assess and select sub-system designs for utilization in MMHEL and develop overall</p>		-	82.000	56.894

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>system-level experimental prototype design. Develop interface controls with the Army Battle Management Communications, Command, Control, Computers and Intelligence (BMC4I) network, and refine system architecture accordingly. Initiate build and integration of system-level experimental prototype hardware.</p> <p>FY 2019 Plans: Will complete design reviews of HEL subsystems (including laser, beam control, power, thermal management, and Army Battle Management Command, Control, and Computers (BMC3) architecture). Will begin integration of HEL subsystem hardware and evaluate 50kW-class laser subsystems against performance parameters. Will develop initial fire control logic for BMC4I software and define BMC4I interfaces with Army BMC4I network. Will develop target laser vulnerability module which provides data on the amount of laser energy required to destroy a given target based upon the location of the laser spot on the target. As complete subsystems are delivered, will integrate into a system-level experimental prototype and begin system checkout.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Planned progression of the MMHEL effort. This effort supports the Army Modernization priority for Air and Missile Defense.</p>				
<p>Title: Next Generation Close Combat Missile</p> <p>Description: The Next Generation Close Combat Missile (NG CCM) effort will demonstrate a prototype close combat missile with a multi-pulse, boost-sustain flight propulsion system providing extended range and decreased time of flight. Activities will mature proof-of-principle hardware into an integrated tactical-representative design and demonstrate a prototype missile with lethality overmatch of emerging threats to address near-term Warfighter needs, in advance of acquisition program of record.</p> <p>FY 2019 Plans: Will optimize and tailor missile propellant formulation to balance performance vs. shock-sensitivity. Will conduct a Force Effectiveness Experiment with the Maneuver Center of Excellence/Maneuver Battle Lab. Will evaluate preliminary design concepts as a basis for trade studies, development of detailed designs, and NG CCM prototype development and testing. Will fabricate wind tunnel models to support further system maturation and testing of NG CCM?s increased range and standoff capabilities.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Planned FY19 Next Generation Close Combat Missile effort. This effort supports the Army Modernization priority for Soldier Lethality.</p>		-	-	9.795
<p>Title: Computational Prototyping Environment</p> <p>Description: The Computational Prototyping Environment (CPE) effort creates an integrated, robust, and verified system that leverages recent Department of Defense advancements in large data tradespace analytics, high-fidelity physics-based modeling, deep learning techniques, high performance computing capabilities, and inverse modeling approaches. The CPE demonstrates</p>		-	1.000	2.295

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
the early developmental verification and validation of selected weapons platform variations in a way that accurately identifies potential performance and design failures, while also testing and mitigating solutions and multiple trades in a Virtual Proving Ground (VPG) prior to cost-bearing production and manufacturing. CPE efforts facilitate rapid, accurate, and computational prototyping in a robust VPG for early performance verification of new capabilities.			
<i>FY 2018 Plans:</i> Develop sustainable integration framework. Begin build of initial VPG and complete CPE architecture.			
<i>FY 2019 Plans:</i> Will complete initial prototype VPG build. Will integrate and validate existing high-fidelity, physics-based models and simulation tools with the prototype VPG to provide an initial proof of concept in support of future VPG development.			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Planned progression of the Computational Prototyping Environment effort.			
Accomplishments/Planned Programs Subtotals	43.314	115.221	95.347

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0604120A: <i>RDT&E,A</i> <i>PE 0604120A</i>	83.279	108.847	87.914	-	87.914	37.847	28.851	-	-	Continuing	Continuing

Remarks
Program Element 0604120A (Assured Positioning, Navigation and Timing (PNT))

D. Acquisition Strategy
Activities will be conducted both in-house and through competitively awarded contracts using best value source selection procedures. Multiple competitive contracts will be awarded. The Other Transaction Agreement (OTA) # W15QKN-14-9-1001 Initiative (Task Order) DOTC-16-01-INIT-0302 will be the primary contract vehicle for the MMHEL effort.

E. Performance Metrics
N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Maturation and Prototyping for C4ISR Systems																												
Vehicle Survivability Subsystem Demonstrator																												
Advanced Powertrain Subsystem Demonstrator																												
Modular Active Protection Systems (MAPS) Demonstrations																												
Active Protection Systems (APS) Integration																												
Multi-Mission High Energy Laser (MMHEL) - System-Level Design																												
MMHEL - Subsystem Design Refinement, Assembly, and Delivery																												
MMHEL - Firing Doctrine and Experimental Prototype System Software																												
MMHEL - Experimental Prototype System Integration and Checkout																												
MMHEL - Experimental Prototype System Demonstration and Assess																												
Next Generation Close Combat Missile																												
Computational Prototyping Environment																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) DS3 / <i>TECHNOLOGY MATURATION INITIATIVES</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Maturation and Prototyping for C4ISR Systems	3	2014	4	2017
Vehicle Survivability Subsystem Demonstrator	1	2017	4	2019
Advanced Powertrain Subsystem Demonstrator	1	2017	4	2019
Modular Active Protection Systems (MAPS) Demonstrations	1	2017	4	2018
Active Protection Systems (APS) Integration	1	2019	4	2021
Multi-Mission High Energy Laser (MMHEL) - System-Level Design	1	2018	3	2018
MMHEL - Subsystem Design Refinement, Assembly, and Delivery	4	2018	4	2019
MMHEL - Firing Doctrine and Experimental Prototype System Software	1	2019	3	2021
MMHEL - Experimental Prototype System Integration and Checkout	2	2019	4	2020
MMHEL - Experimental Prototype System Demonstration and Assess	4	2020	4	2021
Next Generation Close Combat Missile	1	2019	4	2021
Computational Prototyping Environment	1	2018	4	2022

Note

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) EX3 / <i>Ground Vehicle Prototyping</i>
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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
EX3: <i>Ground Vehicle Prototyping</i>	-	14.423	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.423
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

This program transitioned to PEO-GCS in FY18.

A. Mission Description and Budget Item Justification

This Project funds the prototyping and demonstration of ground vehicle technologies. The main goals are to conduct technical assessments against selected capability trades and future technologies for current and future combat vehicles across the combat vehicle portfolio. The funding will support continuing advanced concept development, trade studies, technology maturation/testing, technical/operational/affordability analyses, and system and subsystem iterative and integrated prototyping to assess future designs that integrate emerging science and technology advancements for current and future combat vehicles and to inform the Army's Force 2025 Maneuvers campaign of learning.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Combat Vehicle Modernization Strategy.

This work is fully coordinated with and complementary to Program Element (PE) 0603005A (Combat Vehicle and Automotive Advanced Technology), and PE 0603645/EV7 (Armored Systems Modernization Advance Development/Combat Vehicle Prototyping).

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

	FY 2017	FY 2018	FY 2019
Title: Ground Vehicle Prototyping	14.423	-	-
Description: This effort conducts system level ground vehicle advanced concepting, prototyping and demonstration. This effort partners Government and industry for an iterative and integrated combat vehicle concepting and prototyping process to inform future vehicle Requirements, inform current and future vehicle performance characteristics, reduce future acquisition risk, and evaluate and update Operational Concepts. Activity includes the integration and demonstration of a series of subsystem demonstrators building off of previous investment in ground combat acquisition and science and technology programs.			
Accomplishments/Planned Programs Subtotals	14.423	-	-

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

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) EX3 / <i>Ground Vehicle Prototyping</i>

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

Remarks

Program Element 0603645A, Armored Systems Modernization Adv Dev, Proj EV7, Combat Vehicle Prototyping

D. Acquisition Strategy

Competitive contracts awarded. This project exercises competitively awarded contracts using best value source selection procedures.

E. Performance Metrics

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) EX3 / <i>Ground Vehicle Prototyping</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Ground Vehicle Prototyping																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) EX3 / <i>Ground Vehicle Prototyping</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Ground Vehicle Prototyping	1	2017	4	2017

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604117A / <i>Short Range Air Defense (M-SHORAD)</i>
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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	-	0.000	20.000	95.085	23.000	118.085	102.806	122.558	267.217	255.788	Continuing	Continuing
FI4: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	-	0.000	20.000	95.085	23.000	118.085	102.806	122.558	267.217	255.788	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Army has a need to improve capabilities to defend maneuver formations and other tactical echelons from low altitude air attack and surveillance. Adaptive threats have developed a suite of airborne threat capabilities, supported by an integrated mix of surface-to-air and surface-to-surface shooters that threaten the ability of maneuver forces to conduct operations. Specifically, maneuver formations require improved air defense identification and defeat capabilities to counter Fixed Wing (FW), Rotary Wing (RW), Unmanned Aerial Systems (UAS) and Rocket Artillery and Mortar (RAM) threats.

This additional capability will be provided through a multi-phase approach that enables rapid fielding of an initial capability, culminating in a program of record that will field a full capability. Initially, the Army will field an interim M-SHORAD solution using an Army Senior Leader Directed Requirement, informed by an FY 2017 M-SHORAD Demonstration. The system or system-of-systems solution will provide the capability to identify, track, and neutralize or destroy low-altitude air threats to include Fixed Wing (FW), Rotary Wing (RW), and Group 1 - 3 Unmanned Aircraft Systems (UAS) while keeping pace and surviving with the maneuver Brigades. This interim solution will be fielded in up to three M-SHORAD battalions. The objective solution is needed to counter FW, RW, UAS, and indirect fires (RAM) threats. Both mounted and dismounted capabilities are required. As part of the objective solution, the 50 kilowatt laser will be assessed for possible transition from Science Technology to an objective M-SHORAD program in FY2022.

FY 2019 base and OCO dollars in the amount of \$118.085 million will continue the interim M-SHORAD capability development and integration of the identified solution into existing maneuver formation equipment. Efforts will include: complete fabrication of production representative articles; begin testing to achieve Urgent Materiel Release; and continue the development and finalization of the required program documentation.

Additionally, FY2019 funds will continue development of an objective M-SHORAD Family of Systems, to include: complete the objective M-SHORAD Family of Systems Analysis of Alternatives (AoA); complete development and approval of all Milestone A documentation; begin Concept Design Development for all M-SHORAD Family of Systems variants, and continue Contract Package development.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604117A / <i>Short Range Air Defense (M-SHORAD)</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	20.000	0.000	-	0.000
Current President's Budget	0.000	20.000	95.085	23.000	118.085
Total Adjustments	0.000	0.000	95.085	23.000	118.085
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	95.085	23.000	118.085

Change Summary Explanation

FY2019 increases of \$95.085 (Base) and \$23.000M (OCO) were due to the realignment of funding from PE0604319A Project DU3 Indirect Fire Protection Capability Increment 2-Intercept (IFPC2).

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604117A / <i>Short Range Air Defense (M-SHORAD)</i>					Project (Number/Name) F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>		
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
F14: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	-	0.000	20.000	95.085	23.000	118.085	102.806	122.558	267.217	255.788	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Army has a need to improve capabilities to defend maneuver formations and other tactical echelons from low altitude air attack and surveillance. Adaptive threats have developed a suite of airborne threat capabilities, supported by an integrated mix of surface-to-air and surface-to-surface shooters that threaten the ability of maneuver forces to conduct operations. Specifically, maneuver formations require improved air defense identification and defeat capabilities to counter Fixed Wing (FW), Rotary Wing (RW), Unmanned Aerial Systems (UAS) and Rocket Artillery and Mortar (RAM) threats.

This additional capability will be provided through a multi-phase approach that enables rapid fielding of an initial capability, culminating in a program of record that will field a full capability. Initially, the Army will field an interim M-SHORAD solution using an Army Senior Leader Directed Requirement, informed by an FY 2017 M-SHORAD Demonstration. The system or system-of-systems solution will provide the capability to identify, track, and neutralize or destroy low-altitude air threats to include Fixed Wing (FW), Rotary Wing (RW), and Group 1 - 3 Unmanned Aircraft Systems (UAS) while keeping pace and surviving with the maneuver Brigades. This interim solution will be fielded in up to three M-SHORAD battalions. The objective solution is needed to counter FW, RW, UAS, and indirect fires (RAM) threats. Both mounted and dismounted capabilities are required. As part of the objective solution, the 50 kilowatt laser will be assessed for possible transition from Science and Technology to an objective M-SHORAD program in FY2022.

FY 2019 base dollars in the amount of \$95.085 million and FY 2019 OCO dollars in the amount of \$23.000 million will continue the interim M-SHORAD capability development and integration of the identified solution into existing maneuver formation equipment. Efforts will include: complete fabrication of production representative articles; begin testing to achieve Urgent Materiel Release; and continue the development and finalization of the required program documentation. Additionally, FY2019 funds will continue development of an objective M-SHORAD Family of Systems, to include: complete the objective M-SHORAD Family of Systems Analysis of Alternatives (AoA); complete development and approval of all Milestone A documentation; begin Concept Design Development for all M-SHORAD Family of Systems variants, and continue Contract Package development.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Interim Solution Materiel Development/Integration	-	15.000	85.085	23.000	108.085
Description: Funding is provided for the following efforts:					
FY 2018 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604117A / <i>Short Range Air Defense (M-SHORAD)</i>	Project (Number/Name) F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>- Leveraged information gathered during the Maneuver - Short Range Air Defense (M-SHORAD) Demonstration to begin hardware/software modifications and integration of sensors and defeat mechanisms based on the Directed Requirement.</p> <p>- Prepared and approved the Demonstration Report</p> <p>- Formed the interim M-SHORAD team</p> <p>- Prepared documentation including the Acquisition Strategy, System Engineering Plan, Test and Evaluation Master Plan, Life-Cycle Sustainment Plan, and Information Support Plan.</p> <p>- Continued development of the Contract requirements</p> <p>- Began the fabrication of production representative articles for testing purposes.</p> <p>FY 2019 Base Plans:</p> <p>- Complete fabrication of production representative articles</p> <p>- Begin testing to achieve Urgent Materiel Release</p> <p>- Continue the development and finalization of the required program documentation</p> <p>FY 2019 OCO Plans:</p> <p>- Complete fabrication of production representative articles</p> <p>- Begin testing to achieve Urgent Materiel Release</p> <p>- Continue the development and finalization of the required program documentation</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p> <p>The increase supports the cost of prototypes and testing in FY2019.</p>					
<p>Title: Objective Family of Systems Development/Integration</p> <p>Description: Funding is provided for the following efforts:</p> <p>FY 2018 Plans:</p> <p>- Began Product Office staffing</p> <p>- Began Contract Package development</p> <p>- Developed the Analysis of Alternatives (AoA) Study Guidance and Plan</p> <p>- Began development of the objective M-SHORAD Family of Systems AoA.</p> <p>- Funded the Validated On-Line Life-Cycle Threat (VOLT)</p> <p>- Conducted Market Research</p> <p>- Conducted the Affordability Analysis</p> <p>- Conducted the objective M-SHORAD Milestone Development Decision</p>	-	5.000	10.000	-	10.000

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604117A / <i>Short Range Air Defense (M-SHORAD)</i>	Project (Number/Name) F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
- Began development of the Milestone A Regulatory and Statutory documentation to include the Acquisition Strategy, Clinger-Cohen Act Compliance, Concept of Operations/Operational Mode Summary/Mission Profile, Core Logistics Determination/Core Logistics and Sustaining Workloads Estimate, Cyber Security Strategy, Life-Cycle Cost Estimate, and Life-Cycle Sustainment Plan					
<i>FY 2019 Base Plans:</i>					
- Conduct activities in support of the Materiel Solutions Analysis Phase (pre-Milestone A)					
- Continue Contract Package development					
- Complete the objective M-SHORAD Family of Systems AoA					
- Complete development and approval of all Milestone A Regulatory and Statutory documentation					
- Begin Concept Design Development for all M-SHORAD Family of Systems variants					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i>					
The increase supports the initiation of the Materiel Solutions Phase.					
Accomplishments/Planned Programs Subtotals	-	20.000	95.085	23.000	118.085

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

Line Item	FY 2017	FY 2018	FY 2019			FY 2020	FY 2021	FY 2022	FY 2023	Cost To	
			Base	OCO	Total					Complete	Total Cost
• CE8710: AVENGER MODS	35.979	62.931	48.670	-	48.670	86.807	165.928	454.994	291.600	0.000	1,146.909

Remarks

M-SHORAD procurement is funded through CE8710 (FY2020-FY2023).

D. Acquisition Strategy

Multi-phase approach using the Maneuver Short Range Air Defense (M-SHORAD) Demonstration as the initial basis to identify near-term interim solutions. The acquisition strategy is to use an Other Transactional Authority (OTA) contract for the purchase of 12 interim solution prototypes according to the content of the directed requirement.

The objective M-SHORAD Family of Systems Product Office sought a Materiel Development Decision in 2QFY2018. The M-SHORAD Family of Systems Product Office plans to conduct a Milestone A and award funds in 2QFY2020 for the competitive development of each M-SHORAD variant with a demonstration of variants from multiple vendors during Technology Maturation and Risk Reduction with a down-select in FY2021. Milestone B is planned for 2QFY2022.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604117A / Short Range Air Defense (M-SHORAD)				F14 I Maneuver - Short Range Air Defense (M-SHORAD)							
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Product Management	PO	Trident, Intuitive Research and others : Huntsville, Alabama	-	-		2.255		3.095	Mar 2018	-		3.095	Continuing	Continuing	Continuing
Subtotal			-	-		2.255		3.095		-		3.095	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
System Engineering and Integration	C/CPIF	TBD : TBD	-	-		1.517		6.522	Jun 2019	-		6.522	Continuing	Continuing	Continuing
Engineering and Technical Support	MIPR	Aviation and Missiles Research Development and Engineering Center : Redstone Arsenal, AL	-	-		0.491		3.010	Jun 2019	-		3.010	Continuing	Continuing	Continuing
System Development and Integration	C/CPIF	TBD : TBD	-	-		13.171		69.821	Jun 2019	23.000	Jun 2019	92.821	Continuing	Continuing	Continuing
Subtotal			-	-		15.179		79.353		23.000		102.353	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Support Costs	MIPR	Aviation and Missiles Command (AMCOM) : Redstone Arsenal, AL	-	-		0.758		3.960	Mar 2018	-		3.960	Continuing	Continuing	Continuing
Subtotal			-	-		0.758		3.960		-		3.960	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604117A / Short Range Air Defense (M-SHORAD)	Project (Number/Name) F14 I Maneuver - Short Range Air Defense (M-SHORAD)

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Directed Requirement					▲ 1 Directed Requirement																							
Interim Solution Material Development/Integration									Interim Solution Material Development/Integration																			
Interim Solution Initial Operational Capability (IOC)																					▲ 4 Interim Solution IOC							
Objective M-SHORAD Materiel Development Decision									▲ 2 Objective M-SHORAD MDD																			
Objective M-SHORAD Materiel Solution Analysis									Objective M-SHORAD Materiel Solution Analysis																			
Objective M-SHORAD Milestone A													▲ 3 Objective M-SHORAD Milestone A															
Objective M-SHORAD Technical Maturity and Risk Reduction																	Objective M-SHORAD TMRR											
Objective M-SHORAD Milestone B																					▲ 5 Objective M-SHORAD Milestone B							
Objective M-SHORAD Milestone Engineering Manufacturing Development																									Objective M-SHORAD EMD			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604117A / <i>Short Range Air Defense (M-SHORAD)</i>	Project (Number/Name) F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Directed Requirement	2	2018	2	2018
Interim Solution Material Development/Integration	2	2018	2	2020
Interim Solution Initial Operational Capability (IOC)	4	2021	4	2021
Objective M-SHORAD Materiel Development Decision	2	2018	2	2018
Objective M-SHORAD Materiel Solution Analysis	2	2018	1	2020
Objective M-SHORAD Milestone A	1	2020	1	2020
Objective M-SHORAD Technical Maturity and Risk Reduction	1	2020	2	2022
Objective M-SHORAD Milestone B	2	2022	2	2022
Objective M-SHORAD Milestone Engineering Manufacturing Development	2	2022	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604118A / <i>TRACTOR BEAM</i>
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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	-	0.000	10.400	52.894	-	52.894	0.000	0.000	0.000	0.000	0.000	63.294
XW0: <i>TRACTOR BEAM</i>	-	0.000	10.400	52.894	-	52.894	0.000	0.000	0.000	0.000	0.000	63.294

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Program Change Summary (\$ in Millions)

	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>
Previous President's Budget	0.000	10.400	10.000	-	10.000
Current President's Budget	0.000	10.400	52.894	-	52.894
Total Adjustments	0.000	0.000	42.894	-	42.894
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	42.894	-	42.894

Change Summary Explanation

Fiscal Year 2019 - Classified Program funds increase.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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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	-	83.074	164.967	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	248.041
ED5: <i>Assured Positioning, Navigation and Timing (PNT)</i>	-	10.689	23.991	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.680
EH8: <i>DISMOUNTED</i>	-	3.076	14.423	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.499
EH9: <i>PSEUDOLITES</i>	-	55.202	79.230	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	134.432
EJ2: <i>MOUNTED</i>	-	14.107	35.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	49.407
EJ3: <i>ANTI-JAM ANTENNA</i>	-	0.000	12.023	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.023

Note
 In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 0604120A transitions to PE 1206120A beginning in FY19.

Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.
 Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.
 Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.
 Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.
 Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

A. Mission Description and Budget Item Justification

Assured Positioning, Navigation and Timing (PNT) will provide the Army's ground maneuver forces access to trusted PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 Apr 2010, approved the Positioning, Navigation and Timing Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. The Material Development Decision (MDD) was approved on 30 Jul 2013. The Assured PNT draft Capabilities Development Document was validated by the Army Requirements Oversight Council (AROC) on 28 Jul 2014.

PNT is a critical enabler of many Army systems. The current GPS capability is a fixed frequency system vulnerable to current and emerging threats, and field conditions (e.g. urban, dense vegetation), which means Warfighter assured access and integrity to PNT is not guaranteed. This situation degrades mission performance to an unacceptable level. Therefore, current Army systems cannot operate at the required PNT Assurance Levels with GPS alone.

Assured PNT is a system of systems consisting of one project (ED5) Assured PNT and four separate and interdependent PNT products; (EH8) Dismounted A-PNT System, (EH9) Pseudolite, (EJ2) Mounted A-PNT System, and (EJ3) Anti-Jam Antenna System (AJAS). These interdependent PNT products assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these four products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The overall mission of PM PNT also includes experimentation and demonstration activities aligned with the Secretary of the Army and Chief Staff of the Army modernizations areas. The final acquisition and contracting strategy are under development.

Assured PNT consists of:

(ED5) - The Assured PNT funding line originally represented the entire program prior to breaking into four separate funding lines. The FY17-FY22 funding is for PNT System of Systems Architecture (SOSA) Testing and Resiliency and Software Assurance Modification (RSAM) to legacy GPS systems.

(EH8) - The Dismounted Assured Positioning, Navigation and Timing (PNT) System is a Size, Weight, Power, and Cost (SWAP-C) optimized military Global Positioning System (GPS) and non-GPS sensor suite that acquires and distributes trusted PNT data to soldier-borne systems.

(EH9) - The Pseudolite system provides area protection and PNT Assurance in GPS denied environments by providing terrestrial radio navigation (GPS-like) service in electronically or physically challenged environments using a higher power signal.

(EJ2) - The Mounted Assured PNT System fuses military GPS with physics based sensors and timing technology to acquire and distribute secure trusted PNT data to tactical client systems on vehicular and watercraft platforms.

(EJ3) - The Anti-Jam Antenna Systems (AJAS) provides GPS signal point protection and PNT Assurance in challenged environments through anti-jam technologies. AJAS enables tactical capabilities through assured signal acquisition in challenged environments.

There are no FY 2019 Base funds. Program Element (PE) 0604120A transitions to PE 1206120A beginning in FY19.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	83.279	164.967	138.323	-	138.323
Current President's Budget	83.074	164.967	0.000	-	0.000
Total Adjustments	-0.205	0.000	-138.323	-	-138.323
• Congressional General Reductions	-0.041	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.164	-			
• Adjustments to Budget Years	-	-	-138.323	-	-138.323

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army Date: February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)
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Change Summary Explanation

FY 2017 reduction of \$.205 million reflects FFRDC and SBIR/STTR Transfer.

RDT&E funding decreased from \$164.967 million in FY2018 to \$0.0 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 0604120A transitions to PE 1206120A beginning in FY19.

- Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.
- Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.
- Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.
- Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.
- Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)			
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
ED5: Assured Positioning, Navigation and Timing (PNT)	-	10.689	23.991	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.680
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

A. Mission Description and Budget Item Justification

Assured PNT will provide the Army's ground maneuver forces access to trusted PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 5 Apr 2010, approved the Positioning, Navigation and Timing Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. The Material Development Decision (MDD) was approved on 30 Jul 2013. The Assured PNT draft Capabilities Development Document was validated by Army Requirements Oversight Council (AROC) on 28 Jul 2014.

There are no FY 2019 Base funds. Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

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

	FY 2017	FY 2018	FY 2019
Title: PNT System of System (SOSA) Testing and Resiliency and Software Assurance Modification (RSAM)	10.689	23.991	-
Description: The effort supports testing of PNT SOSA of Army PNT capabilities and RSAM.			
FY 2018 Plans: FY18 Base funds will support Systems of Systems testing of Army PNT capabilities. This testing will inform the Resiliency and Software Assurance Modification (RSAM) and Assured PNT requirements and will validate RSAM implementation. RSAM will include software modifications to Army legacy receivers and GPS systems. RSAM will receive Defense Advanced GPS Receiver (DAGR) and Ground Based GPS Receiver Applications Module (GB-GRAM) engineering builds. DAGR and other receivers analysis will be completed.			
FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding decreased from \$23.991 million in FY2018 to \$0.0 million in FY2019. The decrease was a result of Program Element (PE) 0604120A project ED5 transitioning to PE 1206120A project FJ8 beginning in FY19.			
Accomplishments/Planned Programs Subtotals	10.689	23.991	-

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

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

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

Remarks

D. Acquisition Strategy

The planned acquisition strategy for Positioning, Navigation and Timing (PNT) System of Systems Architecture (SOSA) testing and Resiliency and Software Assurance Modification (RSAM) implementation is to award sole source contracts to the original equipment manufacturers and leverage the Communications Electronics Research Development Engineering Center (CERDEC) to develop and evaluate solutions to enhance the resiliency of Global Positioning System (GPS)-dependent systems operating in evolving contested environments. PNT SOSA testing and RSAM implementation will complete software development for Defense Advanced GPS Receiver (DAGR) and Ground Based GPS Receiver Applications Module (GB-GRAM), to include engineering build testing and formal qualification testing, as well as integration and integration testing, for platforms utilizing DAGR and GB-GRAM engineering builds.

Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support	Allot	PM PNT : Various	0.485	0.649	Oct 2016	0.693	Oct 2017	-		-		-	0.000	1.827	-
Subtotal			0.485	0.649		0.693		-		-		-	0.000	1.827	N/A

Remarks
Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
AM2P - DOTC GPS Receiver Prototypes	C/FFP	Rockwell Collins : Cedar Rapids, IA	0.630	-		-		-		-		-	0.000	0.630	-
AM2P - DOTC GPS Receiver Prototypes	C/CPFF	L-3 IEC : Anaheim, CA	0.600	-		-		-		-		-	0.000	0.600	-
AM2P - DOTC GPS Receiver Prototypes	C/CPFF	EOIR Technologies : Fredericksburg, VA	3.982	-		-		-		-		-	0.000	3.982	-
AM2P - DOTC GPS Receiver Prototypes	C/CPFF	SAVIT : Rockaway, NJ	0.286	-		-		-		-		-	0.000	0.286	-
AM2P - GPS/PGM Integration	MIPR	various : various	2.989	-		-		-		-		-	0.000	2.989	-
Develop Pseudolite Competitive Prototype Contractor 1	C/CPIF	Datapath - Rockwell Collins : Cedar Rapids, IA	3.615	-		-		-		-		-	0.000	3.615	-
Develop Pseudolite Competitive Prototype Contractor 2	C/CPIF	L-3 Communications : Anaheim, CA	3.237	-		-		-		-		-	0.000	3.237	-
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	-	-		3.035	Feb 2018	-		-		-	0.000	3.035	-
RSAM - GB-GRAM Software Development	SS/CPFF	GCC Technologies : Oakland, MD	-	2.770	Aug 2017	5.892	Jan 2018	-		-		-	0.000	8.662	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018				
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)							

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
RSAM - Develop RSAM Integration Modifications	Various	Various : Various	-	-		1.890	Dec 2017	-		-		-	0.000	1.890	-
Subtotal			15.339	2.770		10.817		-		-		-	0.000	28.926	N/A

Remarks
Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Contracting Services	C/FFP	Various : Various	0.920	5.266	Jan 2017	4.262	Dec 2017	-		-		-	0.000	10.448	-
Engineering and Technical Government Services	MIPR	C4ISR : Various	1.290	0.562	Jan 2017	1.296	Nov 2017	-		-		-	0.000	3.148	-
AM2P - Government Eng	MIPR	ARDEC : Picatinny, NJ	3.996	-		-		-		-		-	0.000	3.996	-
AM2P - Joint PGM SME	MIPR	Various : Various	3.441	-		-		-		-		-	0.000	3.441	-
Subtotal			9.647	5.828		5.558		-		-		-	0.000	21.033	N/A

Remarks
Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
AM2P - Bench Top Component Level Test	MIPR	Various : Various	0.112	-		-		-		-		-	0.000	0.112	-
AM2P - Flight Tests	MIPR	Various : Yuma Proving Ground, AZ	0.780	-		-		-		-		-	0.000	0.780	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)
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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
SOSA Testing/RSAM - Government Eng Support	MIPR	Various : Various	-	0.942	Jan 2017	3.660	Nov 2017	-		-		-	0.000	4.602	-
SOSA Testing/RSAM - Contractor Eng Support	Various	Various : Various	-	-		1.998	Dec 2017	-		-		-	0.000	1.998	-
Platform Integration Testing	Various	Various : Various	-	0.500	Aug 2017	-		-		-		-	0.000	0.500	-
SOSA Testing/RSAM Test Equipment	Various	Various : Various	-	-		1.265	Jan 2018	-		-		-	0.000	1.265	-
Subtotal			0.892	1.442		6.923		-		-		-	0.000	9.257	N/A

Remarks
Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

	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	26.363	10.689	23.991	-	-	-	0.000	61.043	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
PNT System of Systems Architecture (SOSA) Testing	[Redacted]				[Redacted]				[Redacted]																			
	SOSA Testing				[Redacted]				[Redacted]																			
RSAM - DAGR Software Development	[Redacted]				[Redacted]				[Redacted]																			
	[Redacted]				DAGR Software Development				[Redacted]																			
RSAM - GB-GRAM Software Development	[Redacted]				[Redacted]				[Redacted]																			
	[Redacted]				[Redacted]				GB-GRAM Software Development																			
Platform Integration Testing	[Redacted]				[Redacted]				[Redacted]																			
	[Redacted]				[Redacted]				Platform Integration																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PNT System of Systems Architecture (SOSA) Testing	1	2017	4	2019
RSAM - DAGR Software Development	1	2018	4	2019
RSAM - GB-GRAM Software Development	4	2017	4	2019
Platform Integration Testing	3	2018	4	2019

Note

Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>					Project (Number/Name) EH8 / <i>DISMOUNTED</i>		
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
EH8: <i>DISMOUNTED</i>	-	3.076	14.423	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.499
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

A. Mission Description and Budget Item Justification

The Dismounted Assured PNT System acquires, protects, and distributes secure PNT on dismounted platforms. Dismounted A-PNT System is a stand-alone system and will be used in conjunction with the PEO Soldier Nett Warrior System. Dismounted A-PNT System is planned to be modular, scalable form-factor that paces the threats and includes development and integration of GPS and non-GPS sensors. Dismounted A-PNT System includes receiver software capable of acquiring Pseudolite signals resulting in additional protection for military GPS in denied environments and includes a migration path to Military-Code (M-Code) and other future technologies.

There are no FY 2019 Base funds. Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

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

	FY 2017	FY 2018	FY 2019
Title: Dismounted A-PNT System	3.076	14.423	-
Description: Risk Reduction efforts to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system.			
FY 2018 Plans: FY2018 Base funds will support risk reduction/prototyping efforts required to mature critical technologies and development of the Acquisition Requirements Package and other documentation to support the Developmental Request for Proposal Release Decision Point milestone.			
FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding decreased from \$14.423 million in FY2018 to \$0.0 million in FY2019. The decrease was a result of Program Element (PE) 0604120A project EH8 transitioning to PE 1206120A project FJ9 beginning in FY19.			
Accomplishments/Planned Programs Subtotals	3.076	14.423	-

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

N/A

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>

D. Acquisition Strategy

Assured Positioning, Navigation and Timing (PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The final acquisition and contracting strategy are under development.

The Dismounted A-PNT System acquisition strategy will conduct development, integration and testing of the Dismounted A-PNT System.

Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH8 / DISMOUNTED
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Government	Allot	PM PNT : APG, MD	-	0.425	Jul 2017	0.558	Oct 2017	-		-		-	0.000	0.983	-
Project Management Support - Contractor	C/CPFF	Various : Various	-	0.180	Jul 2017	0.186	Dec 2017	-		-		-	0.000	0.366	-
Subtotal			-	0.605		0.744		-		-		-	0.000	1.349	N/A

Remarks
Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Development of a Dismounted M-Code capable prototype	C/CPFF	L3, IEC : Anaheim, CA	-	0.524	Sep 2017	5.200	Dec 2017	-		-		-	0.000	5.724	-
Development of a small SWAP-C multi sensor navigation prototype	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	1.253	Jul 2017	4.694	Dec 2017	-		-		-	0.000	5.947	-
Development of sensor fusion algorithm	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	-		0.789	Dec 2017	-		-		-	0.000	0.789	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	-		0.412	Dec 2017	-		-		-	0.000	0.412	-
Subtotal			-	1.777		11.095		-		-		-	0.000	12.872	N/A

Remarks
Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH8 / DISMOUNTED
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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Government	Various	C4ISR : Various	-	0.425	Jul 2017	0.904	Nov 2017	-		-		-	0.000	1.329	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	0.269	Sep 2017	1.444	Dec 2017	-		-		-	0.000	1.713	-
Subtotal			-	0.694		2.348		-		-		-	0.000	3.042	N/A

Remarks
Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Test Support - Contractor	C/Various	Various : Various	-	-		0.236	Dec 2017	-		-		-	0.000	0.236	-
Subtotal			-	-		0.236		-		-		-	0.000	0.236	N/A

Remarks
Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

	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	-	3.076	14.423	-	-	-	0.000	17.499	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Dismounted A-PNT Risk Reduction Activities																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Dismounted A-PNT Risk Reduction Activities	4	2017	3	2019

Note
Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>					Project (Number/Name) EH9 / <i>PSEUDOLITES</i>		
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
EH9: <i>PSEUDOLITES</i>	-	55.202	79.230	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	134.432
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.

A. Mission Description and Budget Item Justification

Highly accurate Positioning, Navigation and Timing (PNT) data is a key enabler and a cross cutting capability for Army forces to execute their mission. The Army requires ground maneuver forces access to trusted PNT information under conditions where space-based PNT may be limited or denied to maintain its Global Positioning System (GPS) military advantage on the battlefield. The current GPS capability is a fixed frequency system which is vulnerable to current and emerging threats and field conditions.

Pseudolite (satellite-like transmitters) assure GPS access and integrity by providing PNT via terrestrial and airborne-based radio navigation GPS transmitters in electronically or physically challenged environments using a higher power signal. Area protection is provided through the deployment of Pseudolite transmitters supporting a Brigade Combat Team area of operations. Pseudolite supports continued operations of PNT-enabled systems such as Blue Force Tracker, Communications Networks and Precision Guided Munitions. Pseudolite consists of three segments:

1. Pseudolite Transmitter segment provides terrestrial and airborne radio navigation (GPS-like) service in electronically or physically challenged environments using a high power signal.
2. Command and Control (C2) segment to control the Pseudolite transmitters on the battlefield.
3. Receiver segment, which will develop software upgrades to current and future military GPS receivers to receive and process the Pseudolite signals.

There are no FY 2019 Base funds. Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.

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

	FY 2017	FY 2018	FY 2019
Title: Pseudolite	55.202	79.230	-
Description: Pseudolite Technology Maturation and Risk Reduction to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system.			
FY 2018 Plans: FY18 Base funds will continue the Technology Maturation and Risk Reduction prototyping and testing effort for the Pseudolite transmitter. In addition, efforts will continue the development of prototype software code for the remote C2 of Pseudolites over a tactical network. Other efforts include: software upgrades to legacy receivers and completion of software development for Precision Guided Munitions to communicate with the Pseudolite transmitter; Security Certification requirements and initial			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH9 / <i>PSEUDOLITES</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>activities toward achievement; implementation of modifications and upgrades to prototypes based on testing results; integration development efforts with Pseudolite Ground and Air host platforms; support to Milestone B activities and documentation preparation/approval; and development of the Acquisition Requirements Package and other documentation to support the Developmental Request for Proposal Release Decision Point milestone.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding decreased from \$79.230 million in FY2018 to \$0.0 million in FY2019. The decrease was a result of Program Element (PE) 0604120A project EH9 transitioning to PE 1206120A project FK1 beginning in FY19.</p>				
Accomplishments/Planned Programs Subtotals		55.202	79.230	-
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
<p>Assured Positioning, Navigation and Timing (PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.</p> <p>The final acquisition and contracting strategy are under development.</p> <p>The Pseudolite Technology Maturation and Risk Reduction (TMRR) acquisition strategy was approved by the Milestone Decision Authority and Milestone A was successfully completed in May 2015. The Pseudolite product is currently in the TMRR Phase of the acquisition life-cycle.</p> <p>The TMRR Acquisition Strategy for Pseudolites includes: 1) Technology maturation of the Transmitter segment through the use of two prototyping, cost-plus fixed fee (CPFF) contracts; 2) Command and Control (C2) segment will leverage the development by other DoD agencies to the greatest extent possible; 3) Receiver segment will make the use of multiple contracts through existing vehicles for Pseudolite Receiver software prototype development.</p> <p>After successful acquisition decision, development, integration and testing of the Pseudolite solution will begin.</p> <p>Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH9 / PSEUDOLITES

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH9 / PSEUDOLITES
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Government	Allot	PM PNT : APG, MD	0.800	1.142	Oct 2016	4.713	Oct 2017	-		-		-	0.000	6.655	-
Project Management Support - Contractor	C/CPFF	Various : Various	0.228	2.010	Nov 2016	1.571	Dec 2017	-		-		-	0.000	3.809	-
FFRDC	SS/CR	MITRE : Various	0.700	-		1.200	Dec 2017	-		-		-	0.000	1.900	-
Subtotal			1.728	3.152		7.484		-		-		-	0.000	12.364	N/A

Remarks
Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Pseudolite Prototype - Transmitter Contractor 1	C/CPFF	Datapath - Rockwell Collins : Cedar Rapids IA	5.663	6.922	Nov 2016	5.806	Dec 2017	-		-		-	0.000	18.391	-
Pseudolite Prototype - Transmitter Contractor 2	C/CPFF	L-3 Communications : Anaheim, CA	5.663	8.364	Oct 2016	6.398	Dec 2017	-		-		-	0.000	20.425	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	9.042	Jun 2017	3.560	Nov 2017	-		-		-	0.000	12.602	-
Pseudolite GPS Receiver Upgrade (DAGR & PGK)	SS/CPFF	Rockwell Collins & L-3 Communications : Cedar Rapids, IA & Anaheim, CA	0.393	8.556	Dec 2016	11.407	Dec 2017	-		-		-	0.000	20.356	-
Pseudolite GPS Receiver Upgrade (GB-GRAM & Excalibur)	SS/CPFF	Rockwell Collins & L-3 Communications : Cedar Rapids, IA & Anaheim, CA	-	-		9.532	Dec 2017	-		-		-	0.000	9.532	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH9 / PSEUDOLITES
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Pseudolite Command & Control	C/Variou	PEO Ammo & PM EW : Various	-	4.231	Dec 2016	10.177	Nov 2017	-		-		-	0.000	14.408	-
OEM Platform Integration Development for Air Platform	SS/CPFF	PEO Aviation : Various	-	2.776	Aug 2017	11.952	Dec 2017	-		-		-	0.000	14.728	-
OEM Platform Integration Development for Ground Platform 1, Platform 2, and Platform 3	SS/CPFF	Various : Various	-	-		1.000	Dec 2017	-		-		-	0.000	1.000	-
PM Platform Integration Development	MIPR	Various : Various	-	0.200	Jun 2017	0.616	Dec 2017	-		-		-	0.000	0.816	-
Subtotal			11.719	40.091		60.448		-		-		-	0.000	112.258	N/A

Remarks
Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Government	Variou	C4ISR : Various	2.653	3.641	Nov 2016	5.591	Nov 2017	-		-		-	0.000	11.885	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	3.451	6.188	Dec 2016	5.307	Dec 2017	-		-		-	0.000	14.946	-
Subtotal			6.104	9.829		10.898		-		-		-	0.000	26.831	N/A

Remarks
Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH9 / <i>PSEUDOLITES</i>
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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Pseudolite Prototype Lab and Field Testing	MIPR	Various : Various	-	2.130	Dec 2016	0.400	Dec 2017	-		-		-	0.000	2.530	-
Subtotal			-	2.130		0.400		-		-		-	0.000	2.530	N/A

Remarks
Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.

Project Cost Totals	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
	19.551	55.202	79.230	-	-	-	0.000	153.983	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH9 / <i>PSEUDOLITES</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Pseudolite (PL) Prototype Development Contractor 1																												
PL Prototype Dev Ctr 1																												
Pseudolite (PL) Prototype Development Contractor 2																												
PL Prototype Dev Ctr 2																												
Pseudolite (PL) Command and Control Development & Test																												
PL Command and Control Dev & Test																												
Pseudolite (PL) Receiver Development & Test																												
PL Receiver Development & Test																												
Pseudolite (PL) Technical Readiness Review																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH9 / <i>PSEUDOLITES</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Pseudolite (PL) Prototype Development Contractor 1	3	2015	2	2019
Pseudolite (PL) Prototype Development Contractor 2	3	2015	2	2019
Pseudolite (PL) Command and Control Development & Test	3	2015	4	2019
Pseudolite (PL) Receiver Development & Test	3	2015	4	2019
Pseudolite (PL) Technical Readiness Review	3	2017	3	2017

Note

Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				Project (Number/Name) EJ2 / MOUNTED			
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
EJ2: MOUNTED	-	14.107	35.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	49.407
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

A. Mission Description and Budget Item Justification

The Mounted Assured Positioning, Navigation and Timing (PNT) System provides PNT data and is a key enabler and a cross cutting capability for Army ground maneuver forces to execute their mission. Army ground maneuver Forces require access to trusted PNT information under conditions where space-based PNT may be limited or denied to maintain its Global Positioning System (GPS) military advantage on the battlefield. The current GPS capability is a fixed frequency system which is vulnerable to current and emerging threats and field condition.

Mounted A-PNT is a scalable form-factor that distributes PNT data to multiple devices (client systems) on mounted platforms. The system fuses military GPS with physics-based sensors and timing technology to provide trusted PNT data, which allows the Soldier to operate in GPS degraded or denied environments. Mounted A-PNT System includes receiver software capable of acquiring Pseudolite signals resulting in additional protection for military GPS in denied environments and paces the threat by including a migration path to Military Code (M-Code) and other future technologies.

There are no FY 2019 Base funds. Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

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

	FY 2017	FY 2018	FY 2019
Title: Mounted A-PNT System	14.107	35.300	-
Description: Risk Reduction efforts to reduce technology risk and to determine the appropriate set of technologies to be integrated into the system.			
FY 2018 Plans: FY2018 Base funds will support regulatory/statutory activities required for a Milestone B decision in FY19 to include documentation preparation/approval, critical technology risk reduction through focused prototyping with industry and Federally Funded Research & Development Center partners, standup of the Systems Integration Lab to begin early integration with over 40 client systems, and development of the Acquisition Requirements Package and other documentation to support the Developmental Request for Proposal Release Decision Point milestone.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
RDT&E funding decreased from \$35.300 million in FY2018 to \$0.0 million in FY2019. The decrease was a result of Program Element (PE) 0604120A project EJ2 transitioning to PE 1206120A project FK2 beginning in FY19.			
Accomplishments/Planned Programs Subtotals	14.107	35.300	-

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

N/A

Remarks

D. Acquisition Strategy

Assured Positioning, Navigation and Timing (PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The final acquisition and contracting strategy are under development.

The Mounted A-PNT System acquisition strategy will conduct development, integration and testing of the Mounted A-PNT System.

Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ2 / MOUNTED
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Government	Allot	PM PNT : APG, MD	-	0.383	Jul 2017	0.813	Nov 2017	-		-		-	0.000	1.196	-
Project Management Support - Contractor	C/CPFF	Various : Various	-	0.238	Jul 2017	0.271	Dec 2017	-		-		-	0.000	0.509	-
FFRDC	SS/CR	MITRE : Various	-	1.450	Sep 2017	1.200	Dec 2017	-		-		-	0.000	2.650	-
Subtotal			-	2.071		2.284		-		-		-	0.000	4.355	N/A

Remarks
Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Prototype Development Contractor 1	C/CPFF	Rockwell Collins : Cedar Rapids, IA	-	0.555	Dec 2017	2.983	Dec 2017	-		-		-	0.000	3.538	-
Prototype Development Contractor 2	C/CPFF	Northrup Grumman : San Diego, CA	-	-		2.583	Dec 2017	-		-		-	0.000	2.583	-
Prototype Development Contractor 3	C/CPFF	GPS Source : Pueblo, CO	-	1.234	Sep 2017	-		-		-		-	0.000	1.234	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	1.805	Jul 2017	2.300	Nov 2017	-		-		-	0.000	4.105	-
Early Platform Integration and Evaluation	MIPR	Various : Various	-	-		6.603	Dec 2017	-		-		-	0.000	6.603	-
Development of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	0.965	Sep 2017	8.092	Dec 2017	-		-		-	0.000	9.057	-
M-Code Small-Chip Development and Prototype to meet Army Requirements	MIPR	Air Force : Various	-	-		5.500	Jan 2018	-		-		-	0.000	5.500	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ2 / MOUNTED
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Stryker Integration	C/CPFF	General Dynamics Land Systems : Sterling Heights MI	-	2.214	Dec 2017	-		-		-		-	0.000	2.214	-
Subtotal			-	6.773		28.061		-		-		-	0.000	34.834	N/A

Remarks
Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Government	Various	C4ISR : various	-	1.267	Jul 2017	1.239	Nov 2017	-		-		-	0.000	2.506	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	3.210	Jul 2017	3.243	Dec 2017	-		-		-	0.000	6.453	-
Subtotal			-	4.477		4.482		-		-		-	0.000	8.959	N/A

Remarks
Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Test Support - Contractor	C/CPFF	Various : Various	-	0.786	Aug 2017	0.473	Dec 2017	-		-		-	0.000	1.259	-
Subtotal			-	0.786		0.473		-		-		-	0.000	1.259	N/A

Remarks
Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Mounted A-PNT Risk Reduction Activities																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mounted A-PNT Risk Reduction Activities	4	2017	3	2019

Note

Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ3 / ANTI-JAM ANTENNA
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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
EJ3: ANTI-JAM ANTENNA	-	0.000	12.023	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.023
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

A. Mission Description and Budget Item Justification

The Anti-Jam Antenna System (AJAS) provides point protection by steering electronic nulls at interference sources or beams at valid signal sources. This enables continuous GPS signal acquisition and tracking in a navigation warfare (jamming) environment. The AJAS is deployed as a scalable component accessory to the Mounted Assured Positioning, Navigation and Timing (PNT) System.

There are no FY 2019 Base funds. Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

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

	FY 2017	FY 2018	FY 2019
Title: Anti-Jam Antenna System	-	12.023	-
Description: Risk reduction activities associated with the AJAS is to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system.			
FY 2018 Plans: FY2018 Base funds will provide support to Milestone B documentation preparation/approval, risk reduction activities to include: development of a Systems Integration Lab used for evaluation of system interoperability, platform integration, and evaluation of commercial AJAS using modeling and simulation; development/modification of commercial AJAS; Anechoic Chamber testing; live-sky testing and the development of the Acquisition Requirements Package to support the Developmental Request for Proposal Release Decision Point milestone.			
FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding decreased from \$12.023 million in FY2018 to \$0.0 million in FY2019. The decrease was a result of Program Element (PE) 0604120A project EJ3 transitioning to PE 1206120A project FK3 beginning in FY19.			
Accomplishments/Planned Programs Subtotals	-	12.023	-

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

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ3 / ANTI-JAM ANTENNA

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

Remarks

D. Acquisition Strategy

Assured Positioning, Navigation and Timing (PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The final acquisition and contracting strategy are under development.

The AJAS acquisition strategy will conduct development, integration and testing of the AJAS.

Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ3 / ANTI-JAM ANTENNA
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Government	Allot	PM PNT : APG, MD	-	-		0.400	Nov 2017	-		-		-	0.000	0.400	-
Project Management Support - Contractor	C/CPFF	Various : Various	-	-		0.112	Dec 2017	-		-		-	0.000	0.112	-
FFRDC	SS/CR	MITRE : Various	-	-		0.600	Dec 2017	-		-		-	0.000	0.600	-
Subtotal			-	-		1.112		-		-		-	0.000	1.112	N/A

Remarks
Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Development of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Lab : APG, MD	-	-		2.235	Dec 2017	-		-		-	0.000	2.235	-
Anti-Jam Antenna Hardware Simulation and Evaluation	MIPR	CERDEC - Command and Integration Directorate : APG, MD	-	-		3.717	Apr 2018	-		-		-	0.000	3.717	-
Early Platform Integration and Evaluation	MIPR	Various : Various	-	-		0.975	Dec 2017	-		-		-	0.000	0.975	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	-		0.412	Dec 2017	-		-		-	0.000	0.412	-
Subtotal			-	-		7.339		-		-		-	0.000	7.339	N/A

Remarks
Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ3 / <i>ANTI-JAM ANTENNA</i>
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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Government	Various	C4ISR : Various	-	-		1.286	Nov 2017	-		-		-	0.000	1.286	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	-		0.429	Dec 2017	-		-		-	0.000	0.429	-
Subtotal			-	-		1.715		-		-		-	0.000	1.715	N/A

Remarks
Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Anti-Jam Antenna Live Sky Demo and Anechoic Chamber Test	MIPR	CERDEC - Command Power and Integration Directorate : APG, MD	-	-		1.857	Dec 2017	-		-		-	0.000	1.857	-
Subtotal			-	-		1.857		-		-		-	0.000	1.857	N/A

Remarks
Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

	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	-	-	12.023	-	-	-	0.000	12.023	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ3 / ANTI-JAM ANTENNA	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Anti-Jam Antenna Risk Reduction Activities																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ3 / ANTI-JAM ANTENNA

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Anti-Jam Antenna Risk Reduction Activities	1	2018	3	2019

Note

Program Element (PE) 0604120 project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604121A / Synthetic Training Environment Refine & Prototype
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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	-	0.000	1.600	77.939	-	77.939	56.867	41.863	41.859	41.852	0.000	261.980
FD6: Synthetic Training Environment Refine & Prototype	-	0.000	1.600	77.939	-	77.939	56.867	41.863	41.859	41.852	0.000	261.980

Note

The STE Program is a new start in FY 2018.

A. Mission Description and Budget Item Justification

The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will train units at the point of need within the entire range of Multi-Domain Battle tasks in support of Unified Land Operations in a complex operational environment. STE will be a synthetic environment (virtual, constructive, and gaming) utilizing one world terrain, common authoritative data and models that is cloud-enabled through the Army Enterprise Network, and is service-based through the Common Operating Environment. The STE will be available for use anywhere a Soldier needs it and will include Soldier and Squad Immersive Virtual Training (S/SVT) capabilities.

FY 2019 base funding of \$77.939 million will develop and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, and refine requirements. Based on refined requirements and demonstrated prototype designs, integrated systems design of the end-item system can be initiated. Additionally, these efforts ensure the level of expertise required to operate and maintain the product is consistent with the force structure.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	1.600	15.044	-	15.044
Current President's Budget	0.000	1.600	77.939	-	77.939
Total Adjustments	0.000	0.000	62.895	-	62.895
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	62.895	-	62.895

Change Summary Explanation

Additional funding provided for STE Research and Development in 2019.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604121A / <i>Synthetic Training Environment Refine & Prototype</i>				Project (Number/Name) FD6 / <i>Synthetic Training Environment Refine & Prototype</i>			
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
FD6: <i>Synthetic Training Environment Refine & Prototype</i>	-	0.000	1.600	77.939	-	77.939	56.867	41.863	41.859	41.852	0.000	261.980
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The STE Program is a new start in FY 2018.

A. Mission Description and Budget Item Justification

The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will train units at the point of need within the entire range of Multi-Domain Battle tasks in support of Unified Land Operations in a complex operational environment. STE will be a synthetic environment (virtual, constructive, and gaming) utilizing one world terrain, common authoritative data and models that is cloud-enabled through the Army Enterprise Network, and is service-based through the Common Operating Environment. The STE will be available for use anywhere a Soldier needs it and will include Soldier and Squad Immersive Virtual Training (S/SVT) capabilities.

FY 2019 base funding of \$77.939 million will develop and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, and refine requirements. Based on refined requirements and demonstrated prototype designs, integrated systems design of the end-item system can be initiated. Additionally, these efforts ensure the level of expertise required to operate and maintain the product is consistent with the force structure.

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

	FY 2017	FY 2018	FY 2019
Title: Program Management	-	1.600	5.791
Description: Will provide program management, engineering and technical oversight, contract support, and travel for the development of the program.			
FY 2018 Plans:			
Funding will be used for Synthetic Training Environment (STE) Program Management to execute Materiel Solutions Analysis (MSA) phase of the STE program with the purpose to choose the concept for the product that will be acquired, to begin translating validated capability gaps into system-specific requirements, including the Key Performance Parameters (KPPs) and Key System Attributes (KSAs), and to conduct planning to support a decision on the acquisition strategy for the product.			
FY 2019 Plans:			
Funding will be used for Program Management to execute Materiel Solutions Analysis (MSA) phase of the program with the purpose to choose the concept for the product that will be acquired, to begin translating validated capability gaps into system-			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604121A / <i>Synthetic Training Environment Refine & Prototype</i>	Project (Number/Name) FD6 / <i>Synthetic Training Environment Refine & Prototype</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
specific requirements, including the Key Performance Parameters (KPPs) and Key System Attributes (KSAs), and to conduct planning to support a decision on the acquisition strategy for the product. FY 2018 to FY 2019 Increase/Decrease Statement: Due to the program being a new start for FY2018, original FY2019 base funding of \$15.1 million was increased to \$77.939 million in order to accelerate the development and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, and refine requirements. This funding will provide for earlier demonstrated prototype designs, integrated systems design of the end-item system. Additionally, these efforts ensure the level of expertise required to operate and maintain the product is consistent with the force structure.			
Title: Engineering, Support, Test & Evaluation Description: Will provide Engineering, support, and any related test and evaluation for the development of the program. FY 2019 Plans: FY 2019 funding will develop and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, and refine requirements. Based on refined requirements and demonstrated prototype designs, integrated systems design of the end-item system can be initiated. Additionally, these efforts ensure the level of expertise required to operate and maintain the product is consistent with the force structure. FY 2018 to FY 2019 Increase/Decrease Statement: Due to the program being a new start for FY2018, original FY2019 base funding of \$15.1 million was increased to \$77.939 million in order to accelerate the development and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, and refine requirements. This funding will provide for earlier demonstrated prototype designs, integrated systems design of the end-item system. Additionally, these efforts ensure the level of expertise required to operate and maintain the product is consistent with the force structure.	-	-	72.148
Accomplishments/Planned Programs Subtotals	-	1.600	77.939

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• NA0173: <i>Aviation Combined Arms Tactical Trainer</i>	38.000	30.568	32.700	-	32.700	34.243	32.372	36.315	37.007	0.000	241.205

Remarks
Procurement funding for STE has been embedded in Line Item NA0173 in the amount of \$8.4 million for FY2019.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604121A / <i>Synthetic Training Environment Refine & Prototype</i>	Project (Number/Name) FD6 / <i>Synthetic Training Environment Refine & Prototype</i>

D. Acquisition Strategy

The Synthetic Training Environment (STE) program will employ an incremental acquisition strategy where the full capability will occur in multiple increments as new capability is developed and delivered. During Materiel Solutions Analysis (MSA) and Technology Maturation Risk Reduction (TMRR) phases competitive prototyping development efforts will be conducted through Other Transactional Authority resulting in system prototypes.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604121A / Synthetic Training Environment Refine & Prototype	Project (Number/Name) FD6 / Synthetic Training Environment Refine & Prototype
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Management Services	Various	PEO STRI : Orlando, FL	-	-		1.600		5.791		-		5.791	0.000	7.391	Continuing
Subtotal			-	-		1.600		5.791		-		5.791	0.000	7.391	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Product Development	TBD	To Be Determined : To Be Determined	-	-		-		70.955		-		70.955	0.000	70.955	-
Subtotal			-	-		-		70.955		-		70.955	0.000	70.955	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Support Costs	TBD	To Be Determined : To Be Determined	-	-		-		1.193		-		1.193	0.000	1.193	-
Subtotal			-	-		-		1.193		-		1.193	0.000	1.193	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			-	-	1.600	77.939	-	77.939	0.000	79.539	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604121A / <i>Synthetic Training Environment Refine & Prototype</i>	Project (Number/Name) FD6 / <i>Synthetic Training Environment Refine & Prototype</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Cross Functional Team Phase II					CFT																							
Matériel Development Decision (MDD)									1 MDD																			
Milestone B (MSB)									2 MSB																			
Engineering & Manufacturing Development (EMD)									EMD																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604121A / <i>Synthetic Training Environment Refine & Prototype</i>	Project (Number/Name) FD6 / <i>Synthetic Training Environment Refine & Prototype</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Cross Functional Team Phase II	2	2018	2	2019
Materiel Development Decision (MDD)	2	2019	2	2019
Milestone B (MSB)	2	2019	2	2019
Engineering & Manufacturing Development (EMD)	2	2019	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604319A / Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)
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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	-	0.000	11.303	51.030	-	51.030	146.731	132.361	156.732	21.528	0.000	519.685
DU3: IFPC2	-	0.000	11.303	51.030	-	51.030	146.731	132.361	156.732	21.528	0.000	519.685

Program MDAP/MAIS Code: Pre

Note

Funding in years prior to FY17 on BA4, PE 0604319/DU3 was for IFPC Inc 2-I Block 1 system development. Funding for FY17 and out for IFPC Inc 2-I Block 1 system development activities has been realigned from BA4, PE 0604319/DU3 to BA5, PE 0605052/EY7 as the program transitions to EMD. Funding for FY18 and out is programmed for Expanded Mission Area Missile (EMAM) interceptor.

A. Mission Description and Budget Item Justification

EMAM program supports the overall Integrated Air and Missile Defense (IAMD) architecture and expands the Indirect Fire Protection Capability Increment 2 - Intercept (IFPC Inc 2-I) Block 1 system's target set by enabling an initial counter-Rocket, Artillery, and Mortar (RAM) capability while providing a second kinetic interceptor capability against Cruise Missiles (CM) and Unmanned Aircraft System (UAS).

The Indirect Fire Protection Capability Increment 2 - Intercept (IFPC Inc 2-I) is a ground-based weapon system that is designed to acquire, track, engage, and defeat the UAS, CM, and RAM threats. Initial IFPC 2-I system development was funded on this line through FY16. The system provides 360-degree protection and simultaneously engages threats arriving from different azimuths. A block acquisition approach will be used to provide this capability. The IFPC Inc 2-I Block 1 system consists of an existing interceptor and sensor and development of fire control software and a Multi-Mission Launcher (MML) to support the UAS and CM defeat mission. The IFPC Inc 2-I system is compatible with the Army Integrated Air and Missile Defense (IAMD) Command and Control (C2) architecture. The IFPC Inc 2-I system is transportable by Army common mobile platforms.

FY2019 base dollars in the amount of \$51.030 million funds integration and testing of a EMAM interceptor into the IFPC Inc 2-I Block 1 Multi-Mission Launcher.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	11.303	52.604	-	52.604
Current President's Budget	0.000	11.303	51.030	-	51.030
Total Adjustments	0.000	0.000	-1.574	-	-1.574
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Year	-	-	-1.574	-	-1.574

Change Summary Explanation

Program Office core employee labor costs moved from RDTE to OMA as part of an OSD auditability directive and revised economic assumptions.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>	Project (Number/Name) DU3 / <i>IFPC2</i>
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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
DU3: <i>IFPC2</i>	-	0.000	11.303	51.030	-	51.030	146.731	132.361	156.732	21.528	0.000	519.685
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding in years prior to FY17 on BA4, PE 0604319/DU3 was for IFPC Inc 2-I Block 1 system development. Funding for FY17 and out for IFPC Inc 2-I Block 1 system development activities has been realigned from BA4, PE 0604319/DU3 to BA5, PE 0605052/EY7 as the program transitions to EMD. Funding for FY18 and out is programmed for Expanded Mission Area Missile (EMAM) interceptor.

A. Mission Description and Budget Item Justification

The EMAM program supports the overall Integrated Air and Missile Defense (IAMD) architecture and expands the Indirect Fire Protection Capability Increment 2 - Intercept (IFPC Inc 2-I) Block 1 system's target set by enabling an initial counter-Rocket, Artillery, and Mortar (RAM) capability while providing a second kinetic interceptor capability against Cruise Missiles (CM) and Unmanned Aircraft System (UAS).

The Indirect Fire Protection Capability Increment 2 - Intercept (IFPC Inc 2-I) is a ground-based weapon system that is designed to acquire, track, engage, and defeat the UAS, CM, and RAM threats. Initial IFPC 2-I system development was funded on this line through FY16. The system provides 360-degree protection and simultaneously engages threats arriving from different azimuths. A block acquisition approach will be used to provide this capability. The IFPC Inc 2-I Block 1 system consists of an existing interceptor and sensor and development of fire control software and a Multi-Mission Launcher (MML) to support the UAS and CM defeat mission. The IFPC Inc 2-I system is compatible with the Army Integrated Air and Missile Defense (IAMD) Command and Control (C2) architecture. The IFPC Inc 2-I system is transportable by Army common mobile platforms.

FY2019 base dollars in the amount of \$51.030 million funds integration and testing of a EMAM interceptor into the IFPC Inc 2-I Block 1 Multi-Mission Launcher.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: System Engineering & Program Management (SEPM)	-	6.503	14.459	-	14.459
Description: Funding is provided for the following efforts:					
FY 2018 Plans:					
<ul style="list-style-type: none"> - Initiate RDT&E efforts associated with IFPC Increment 2-I Block 1 second interceptor - Perform system engineering, integration, logistics engineering, system test and evaluation management, technical configuration control, cost and business management activities - Conduct system technical reviews and program management reviews - Perform technical assessments, concept studies, cost reduction, risk reduction, and required documentation 					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>	Project (Number/Name) DU3 / <i>IFPC2</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>- Conduct program decision preparation, documentation, and execution activities</p> <p>FY 2019 Base Plans:</p> <ul style="list-style-type: none"> - Continue RDT&E efforts associated with Second interceptor - Perform system engineering, integration, logistics engineering, system test and evaluation management, technical configuration control, cost and business management activities - Conduct system technical reviews and program management reviews to include Design Review 2, Systems Requirement Review (SRR) and Systems Functional Review (SFR) of 3 Vendors - Develop Tailored Acquisition Strategy - Verify Technology Readiness - Down Selection process from 3 Vendors to 1 Vendor for Material Solution. - Conduct Preliminary Design Review (PDR) - Perform technical assessments, concept studies, cost reduction, risk reduction, and required documentation for Milestone B Decision - Conduct program decision preparation, Milestone B documentation, Source Selection documentation and execution activities <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding supports events planned in their respective years.</p>					
<p>Title: Engineering and Technical Support</p> <p>Description: Funding is provided for the following efforts:</p> <p>FY 2018 Plans:</p> <ul style="list-style-type: none"> - Initiate IFPC Increment 2-I Block 1 second interceptor engineering and technical support for design of system hardware, software, and integration requirements - Participate in system technical and program management reviews - Perform technical assessments, concept studies, cost reduction, risk reduction, and required documentation <p>FY 2019 Base Plans:</p> <ul style="list-style-type: none"> - Continue Second Interceptor engineering and technical support for design of system hardware, software, and integration requirements - Develop Tailored Acquisition Strategy - Verify Technology Readiness - Down Selection process from 3 Vendors to 1 Vendor for Material Solution. 	-	0.200	1.252	-	1.252

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>	Project (Number/Name) DU3 / <i>IFPC2</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<ul style="list-style-type: none"> - Conduct Preliminary Design Review (PDR) - Perform technical assessments, concept studies, cost reduction, risk reduction, and required documentation for Milestone B Decision - Conduct program decision preparation, Milestone B documentation, Source Selection documentation and execution activities Participate in system technical and program management reviews - Preparation of Milestone B Decision Briefings and Documentation. <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding supports events planned in their respective years.</p>					
<p>Title: System/Subsystem Development and Integration</p> <p>Description: Funding is provided for the following efforts:</p> <p>FY 2018 Plans:</p> <ul style="list-style-type: none"> - Initiate IFPC Increment 2-I Block 1 second interceptor hardware and software integration activities - Participate in system technical and program management reviews - Perform technical assessments, concept studies, cost reduction, required documentation, integration and component risk reduction <p>FY 2019 Base Plans:</p> <ul style="list-style-type: none"> - Continue Second Interceptor hardware and software integration activities - Participate in system technical and program management reviews - Perform technical assessments, concept studies, cost reduction, required documentation, integration and component risk reduction - Develop Tailored Acquisition Strategy - Verify Technology Readiness - Down Selection process from 3 Vendors to 1 Vendor for Material Solution. - Conduct Preliminary Design Review (PDR) - Conduct program decision preparation, Milestone B documentation, Source Selection documentation. - Preparation of Milestone B Decision Briefings and Documentation. <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding supports events planned in their respective years.</p>	-	4.191	33.606	-	33.606
<p>Title: System/Subsystem Developmental Testing</p>	-	0.409	1.713	-	1.713

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>	Project (Number/Name) DU3 / <i>IFPC2</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p><i>FY 2018 Plans:</i></p> <ul style="list-style-type: none"> - Initiate Developmental testing activities - Initiate Modeling and Simulation test activities - Initiate Cyber Security test activities <p><i>FY 2019 Base Plans:</i></p> <ul style="list-style-type: none"> - Continue Developmental testing activities - Continue Modeling and Simulation test activities - Continue Cyber Security test activities - Participate in system technical and program management reviews - Perform technical assessments, concept studies, cost reduction, required documentation, integration and component risk reduction - Develop Tailored Acquisition Strategy - Verify Technology Readiness - Down Selection process from 3 Vendors to 1 Vendor for Material Solution. - Conduct Preliminary Design Review (PDR) - Conduct program decision preparation, Milestone B documentation, Source Selection documentation. <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Funding supports events planned in their respective years.</p>					
Accomplishments/Planned Programs Subtotals	-	11.303	51.030	-	51.030

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
• C53101: <i>MSE Missile</i>	809.201	1,106.040	871.276	260.000	1,131.276	512.775	734.152	727.032	813.280	793.430	6,627.186
• 0205456A: <i>Lower Tier Air and Missile Defense (AMD) System</i>	61.449	78.926	79.283	-	79.283	107.785	111.124	121.376	117.336	Continuing	Continuing
• 0604114A: <i>Lower Tier Missile Defense (LTAMD) Capability</i>	33.780	76.728	120.374	-	120.374	125.772	376.738	332.322	241.461	0.000	1,307.175
• C50016: <i>Lower Tier Air and Missile Defense (AMD)</i>	126.470	140.826	111.395	-	111.395	130.051	105.044	107.288	106.178	0.000	827.252

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>	Project (Number/Name) DU3 / <i>IFPC2</i>
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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
• 0605052A: <i>Indirect Fire Protection Capability Increment 2</i>	80.781	175.069	157.710	-	157.710	77.599	32.517	-	-	0.000	523.676
• C62002: <i>IFPC INC 2-I BLOCK 1 SYSTEM</i>	-	-	0.000	-	0.000	175.576	303.422	273.802	388.377	0.000	1,141.177
• C61001: <i>INDIRECT FIRE PROTECTION CAPABILITY INC 2-I</i>	-	57.742	145.636	-	145.636	319.042	402.938	300.466	424.655	Continuing	Continuing
• E10: <i>Sentinel</i>	15.368	32.968	39.338	-	39.338	91.534	96.427	80.394	43.874	0.000	399.903
• S40: <i>Army Integrated Air and Missile Defense</i>	273.240	336.420	277.607	-	277.607	200.275	130.860	63.741	33.196	0.000	1,315.339
• BZ5075: <i>IAMD Battle Command System</i>	-	-	0.000	-	0.000	72.307	323.680	428.572	497.974	Continuing	Continuing
• 0604741A: <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	200.205	28.726	95.172	119.300	214.472	15.577	9.310	2.915	29.489	0.000	500.694
• AD5070: <i>AIR & MSL Defense Planning & Control Sys</i>	126.539	35.735	33.837	-	33.837	24.983	49.385	68.021	63.273	0.000	401.773
• C62005: <i>IFPC INC 2-I Block 1 Missile 2</i>	-	-	0.000	-	0.000	-	-	12.192	36.278	0.000	48.470

Remarks

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

The EMAM Product Office will seek a program decision in 1QFY18. The EMAM Product Office plans to award funds for the integration and testing of the second interceptor utilizing a two-phased approach with a demonstration of interceptors from multiple vendors during phase one with a down-select to a single vendor for phase two. Phase two will consist of activities to finalize design and integration of the interceptor and conduct developmental testing.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	Project (Number/Name) DU3 / IFPC2
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Program Management Admin (IFPC Base System)	MIPR	Cruise Missile Defense Systems Project Office : Huntsville, Alabama	28.644	-		-		-		-		-	Continuing	Continuing	Continuing
Program Management Admin	Various	Multiple Activities : Redstone Arsenal, Alabama	-	-		4.903	Oct 2017	5.753	Oct 2018	-		5.753	Continuing	Continuing	Continuing
Subtotal			28.644	-		4.903		5.753		-		5.753	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
System Engineering & Integration (IFPC Base System)	MIPR	Cruise Missile Defense Systems Project Office : Huntsville, AL	54.463	-		-		-		-		-	Continuing	Continuing	Continuing
System Engineering & Integration	Various	Multiple Activities : Huntsville, AL	-	-		1.600	Oct 2017	3.871	Oct 2018	-		3.871	Continuing	Continuing	Continuing
Engineering and Technical Support (IFPC Base System)	MIPR	Multiple Activities : Multiple Locations	140.824	-		-		-		-		-	Continuing	Continuing	Continuing
Engineering and Technical Support	Various	Multiple Activities : Multiple Locations	-	-		0.200	Oct 2017	1.252	Oct 2018	-		1.252	Continuing	Continuing	Continuing
System/Subsystem Development and Integration (IFPC Base System)	MIPR	Multiple Activities : Multiple Locations	120.035	-		-		-		-		-	Continuing	Continuing	Continuing
System/Subsystem Development and Integration	C/CPFF	TBD : Multiple Locations	-	-		4.191	Jan 2018	33.606	Feb 2019	-		33.606	Continuing	Continuing	Continuing
Subtotal			315.322	-		5.991		38.729		-		38.729	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>	Project (Number/Name) DU3 / <i>IFPC2</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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 1 Pre-Milestone (MS) B Activities	█																											
EMAM Interceptor Pre-MS B Activities	█				█																							
EMAM Interceptor MS B													▲ MS B															
EMAM Interceptor Engineering and Manufacturing Development													█															
EMAM Interceptor MS C																					▲ MS C							
EMAM Interceptor Low Rate Initial Production (LRIP)																					█							
EMAM Interceptor Initial Operational Capability (IOC)																									▲ IOC			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A / <i>Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>	Project (Number/Name) DU3 / <i>IFPC2</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Block 1 Pre-Milestone (MS) B Activities	1	2014	1	2017
Engineering Demonstration (ED)	2	2016	3	2016
EMAM Interceptor Pre-MS B Activities	1	2018	4	2019
EMAM Interceptor MS B	1	2020	1	2020
EMAM Interceptor Engineering and Manufacturing Development	1	2020	1	2023
EMAM Interceptor MS C	1	2023	1	2023
EMAM Interceptor Low Rate Initial Production (LRIP)	1	2023	4	2023
EMAM Interceptor Initial Operational Capability (IOC)	4	2023	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>
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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	-	29.336	56.492	65.817	-	65.817	65.102	66.578	72.697	73.463	0.000	429.485
FA8: <i>Cyberspace Operations Forces and Force Support</i>	-	29.336	56.492	65.817	-	65.817	65.102	66.578	72.697	73.463	0.000	429.485

A. Mission Description and Budget Item Justification

Persistent Cyber Training Environment (PCTE) will provide the Department of Defense (DoD) cyber forces with a standardized training capability with access to existing Cyber Training Ranges (CTR) and available training resources and content. The current environment does not have the capacity to maintain a persistent environment and is primarily used for major exercises (i.e. Cyber Flag). The service cyber components have established their own training environments but do not have standardized capabilities or content. PCTE system approaches are aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD AT&L) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE. Program is directed by the 2016 National Defense Authorization Act, Section 1645. Prototype, integration, and testing efforts in FY19 will complete the capabilities required to meet Initial Operational Capability (IOC) per the PCTE Executive Board developed IOC definition.

B. Program Change Summary (\$ in Millions)

	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>
Previous President's Budget	40.510	56.492	52.817	-	52.817
Current President's Budget	29.336	56.492	65.817	-	65.817
Total Adjustments	-11.174	0.000	13.000	-	13.000
• Congressional General Reductions	-0.015	-			
• Congressional Directed Reductions	-10.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.159	-			
• Adjustments to Budget Years	-	-	13.000	-	13.000

Change Summary Explanation

FY19 increase to address critical weapon system evaluation & hardening in response to threat cyber vulnerabilities.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>				Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>			
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
FA8: <i>Cyberspace Operations Forces and Force Support</i>	-	29.336	56.492	65.817	-	65.817	65.102	66.578	72.697	73.463	0.000	429.485
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Persistent Cyber Training Environment (PCTE) will provide the Department of Defense (DoD) cyber force with a capability that uses a combination of loosely affiliated or independent virtual environments with varied capabilities that are not scalable or extensible. The current environment constrains training capabilities and capacity, but lack a joint or standard approach consistent with a broader vision of PCTE. PCTE system approaches are aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD AT&L) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The US Army acknowledges it is the lead candidate service to perform as the Executive Agent (EA) for Cyber Training Ranges and DoD Acquisition Lead for the PCTE. Program is directed by the 2016 National Defense Authorization Act, Section 1645. Prototype, integration, and testing efforts in FY19 will complete the capabilities required to meet Initial Operational Capability (IOC) per the PCTE Executive Board developed IOC definition.

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

	FY 2017	FY 2018	FY 2019
Title: Event Management for Persistent Cyber Training Environment (PCTE)	10.495	18.600	23.400
Description: Develop event scheduling, allocation, and management function for PCTE, to include event design, planning and execution, supported by standardized training assessment tools and capabilities.			
FY 2018 Plans: Continue development and management of Event Management for PCTE, to include the physical and logical infrastructure of the training platform and core training environment that allows for automated training events at the individual and team level. It will also include instances at the unclassified, secret, and top secret classification levels. Event management is the integration of multiple applications that support a training event. The capabilities include a master control, centralized order portal, event design, event control, automated opposition force, technical support, assessments and feedback, content library and tool management repository, and a virtual classroom. FY17 included the procurement and evaluation of event management application prototypes. In FY18, those event management applications will be integrated into a PCTE platform and provided to the Service Cyber components.			
FY 2019 Plans: Event management capabilities will continue to build on previous year's efforts by introducing new capability and continuing to refine those already integrated based on Cyber Mission Forces' (CMF) evaluations. The Program Management Office will continue development, integration, and evaluation of prototype applications that will satisfy the PCTE requirement gaps and meet the			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>IOC definition. This includes training package development, event scheduling and event execution. Through this, Cyber Mission Forces will be provided the ability to plan, design, execute and assess training.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Additional funding required to support the integration of capabilities into drops, developmental and operational testing, and accreditation.</p>				
<p>Title: Environment operations and management for Persistent Cyber Training Environment (PCTE)</p> <p>Description: Develop PCTE with realistic vignettes/scenarios as part of a system (syllabus) of individual and collective training that includes certification and real-world mission rehearsals.</p> <p>FY 2018 Plans: Provides for the creation of a robust cloud network connecting participating cyber training ranges and the ability for the PCTE to utilize resources and content at the participating cyber ranges. This eliminates the need to replicate those environments for every PCTE instantiation. The environment includes the emulation of blue, red, green, and gray networks as well as the ability to replicate Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition (SCADA) environments. These environments provide the "maneuver" space and training grounds for Cyber Mission Forces (CMF). FY18 will provide the virtual connections with the PCTE in order for the CMF trainee to choose the maneuver environment while establishing the training event. This will also include the ability to "clean" after the completion of training so that the next student has a neutral environment. This will also include the ability to use current threat information and intelligence to ensure that the environments remain current and relevant providing a realistic training environment.</p> <p>FY 2019 Plans: FY19 continues building emulated environments and the hybrid cloud environment with the participating cyber ranges to support team/group, and force level training events. The emulated environments includes the emulation of blue, red, green, and gray networks as well as the ability to replicate Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition (SCADA) environments. These environments provide the "maneuver" space and training grounds for Cyber Mission Forces (CMF). FY19 funds the virtual connections with the PCTE in order for the CMF trainee to choose the maneuver environment while establishing the training event. This will also include the ability to sanitize the environment at the completion of training so that the next student has a neutral environment. This will include the ability to use current threat information and intelligence to ensure that the environments remain current and relevant providing a realistic training environment.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p>		9.536	14.130	13.400

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Decrease due to change in requirements from the creation of PCTE environments in FY18 to the modification of existing environments in FY19.				
<p>Title: Physical and Virtual Connectivity for the Persistent Cyber Training Environment (PCTE)</p> <p>Description: On-Demand reliable, secure physical and virtual global access from wherever participants are geographically located. A core cyber exercise network and event management platform with access to the full suite of DoD, Service, Interagency, Multinational, and State distributed systems.</p> <p>FY 2018 Plans: Provides for the connectivity at multiple security levels and the compute and storage requirements to support the processing of the PCTE and required data. FY18 will provide robust connectivity to the cyber ranges defined in the PCTE Initial Capability Document, in support of Section 1645 of the 2016 NDAA. The new sites will support the establishment of the cloud environment and provide the access to the resources and content from the participating cyber training ranges and the Service Cyber components.</p> <p>FY 2019 Plans: Will continue to build and refine on the initial connectivity established in prior years to include establishing a robust hybrid cloud environment and expanding to access multiple training facilities within one geographic location. Current connections to the CMF sites will be optimized to reduce latency and efficiency on the existing persistent backbone transport bandwidth. This will include providing network nodes at training sites and cyber ranges directly supporting PCTE.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decreased funding due to the majority of connectivity requirements satisfied with FY18 dollars.</p>		9.305	19.780	10.500
<p>Title: Government Program Management for Persistent Cyber Training Environment (PCTE)</p> <p>FY 2018 Plans: Will provide program management, engineering and technical oversight, contract support and travel for the PCTE program.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decrease due to Department of Army civilian labor costs moved to Operations & Maintenance, Army appropriation.</p>		-	2.300	-
<p>Title: Persistent Cyber Training Environment (PCTE) Test and Evaluation</p> <p>FY 2018 Plans:</p>		-	1.682	5.517

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>Persistent Cyber Training Environment is the integration of multiple applications and environments as well as connectivity to the existing Cyber Ranges. These funds will provide for required significant testing. This funding will be used for integration testing, field evaluations, and operational testing.</p> <p>FY 2019 Plans: Continue to complete multi-levels of evaluation and testing on individual products, integrated capabilities, and capability drops. This includes integration testing, field evaluations, and operational testing. Execute formal validation and verifications events prior to release of capability drops assuring capabilities perform as expected.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Increased testing required to validate PCTE IOC capabilities.</p>			
<p>Title: Cyber Operational Risk Assessment-Programs (CORA-P)</p> <p>Description: CORA-P is the Army's response to 2016 and 2017 NDAA which directed the DoD to evaluate threat cyber vulnerabilities of major weapon systems. The project aligns with NDAA language establishing PCTE mandating the utilization of cyber capabilities across testing and training. Efforts will focus on threat cyber vulnerability assessments of weapon systems post Milestone C, provide input to the DoD effort to understand mission thread risk, and facilitate effective threat cyber training.</p> <p>FY 2019 Plans: In FY19, CORA-P will complete assessments of the remaining systems tasked to the Department, as well as, establish the enduring program as directed to remediate threat cyber vulnerabilities. CORA-P will assess the operational risk from threat cyber vulnerabilities of major weapon systems from a peer or near-peer adversary profile.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY19 funds increased to build upon the ongoing PCTE development for distributed capabilities to continuously assess threat cyber vulnerabilities to Army systems, operational environments, and leverage assessment findings to ensure threat cyber defenders are properly trained to face the latest emerging cyber threats.</p>	-	-	13.000
Accomplishments/Planned Programs Subtotals	29.336	56.492	65.817

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OMA 121251000: <i>Cyberspace Operations Forces and Force Support</i>	-	6.300	9.082	-	9.082	9.040	9.294	9.245	9.358	0.000	52.319

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• B65010: <i>Persistent Cyber Training Environment</i>	-	4.000	3.000	-	3.000	3.000	3.000	3.000	3.000	0.000	19.000

Remarks

D. Acquisition Strategy

The Persistent Cyber Training Environment (PCTE) program will employ an incremental acquisition strategy. The strategy leverages the use of existing cyber contract and Other Transaction Authorities (OTA) vehicles in FY17 and FY18 to provide high priority capabilities. PCTE will provide iterative capability in prototypes provided to the Cyber Mission Forces (CMF) in drops for further evaluation. These capability drops will be based on requirements contained and further developed as part of the PCTE Information System Capability Development Document (IS CDD). Efforts in FY19 focus on expanding access, developing, integrating, and evaluation prototype capability drops. In addition, limited capabilities provided in prior years will continue to be improved and developed. A full and open competitive contract will be awarded in FY20 for further integration of new or refinement of existing capabilities, hardware refreshes, accreditation, and software licensing.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Government Program Management	TBD	Various : Various	-	-		2.300		-		-		-	Continuing	Continuing	Continuing
Subtotal			-	-		2.300		-		-		-	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
PCTE Development and Integration	Option/CPFF	Various : Various	-	29.336	Sep 2017	52.509	May 2018	47.300	Feb 2019	-		47.300	Continuing	Continuing	Continuing
Cyber Operational Risk Assessment	Option/CPFF	Various : Various	-	-		-		13.000	Feb 2019	-		13.000	Continuing	Continuing	Continuing
Subtotal			-	29.336		52.509		60.300		-		60.300	Continuing	Continuing	N/A

Remarks
FY18 funds will be placed as an option on the FY17 contract.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
PCTE Government Test and Evaluation	Various	Various : To Be Determined	-	-		1.683	Mar 2018	5.517	Mar 2019	-		5.517	Continuing	Continuing	Continuing
Subtotal			-	-		1.683		5.517		-		5.517	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			-	29.336	56.492	65.817	-	65.817	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Event Management	[Redacted]																											
Environment	[Redacted]																											
Connectivity	[Redacted]																											
Training Sites	[Redacted]																											
Test and Evaluation	[Redacted]																											
Cyber Operational Risk Assessment	[Redacted]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Event Management	1	2017	4	2023
Environment	1	2017	4	2023
Connectivity	1	2017	4	2023
Training Sites	1	2017	4	2023
Test and Evaluation	2	2018	4	2023
Cyber Operational Risk Assessment	2	2019	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206120A / <i>ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)</i>
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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	-	0.000	0.000	146.300	-	146.300	80.864	33.074	1.653	0.000	Continuing	Continuing
FJ8: <i>Assured Positioning, Navigation and Timing (PNT)</i>	-	0.000	0.000	59.058	-	59.058	25.499	10.350	0.000	0.000	Continuing	Continuing
FJ9: <i>Dismounted PNT</i>	-	0.000	0.000	15.989	-	15.989	3.060	0.550	0.000	0.000	Continuing	Continuing
FK1: <i>PSEUDOLITES PNT</i>	-	0.000	0.000	38.302	-	38.302	18.106	6.529	0.000	0.000	Continuing	Continuing
FK2: <i>MOUNTED PNT</i>	-	0.000	0.000	22.816	-	22.816	14.698	7.594	0.000	0.000	Continuing	Continuing
FK3: <i>ANTI-JAM ANTENNA PNT</i>	-	0.000	0.000	10.135	-	10.135	19.501	8.051	1.653	0.000	Continuing	Continuing

Note
This is not a new start program. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A transitions from PE 0604120A beginning in FY19.

Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.
 Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.
 Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.
 Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.
 Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

A. Mission Description and Budget Item Justification
 Assured Positioning, Navigation and Timing (PNT) will provide the Army's ground maneuver forces access to trusted PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 Apr 2010, approved the Positioning, Navigation and Timing Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. The Material Development Decision (MDD) was approved on 30 Jul 2013. The Assured PNT draft Capabilities Development Document was validated by the Army Requirements Oversight Council (AROC) on 28 Jul 2014.

PNT is a critical enabler of many Army systems. The current GPS capability is a fixed frequency system vulnerable to current and emerging threats, and field conditions (e.g. urban, dense vegetation), which means Warfighter assured access and integrity to PNT is not guaranteed. This situation degrades mission performance to an unacceptable level. Therefore, current Army systems cannot operate at the required PNT Assurance Levels with GPS alone.

Assured PNT is a system of systems consisting of one project (FJ8) Assured PNT and four separate and interdependent PNT products; (FJ9) Dismounted A-PNT System, (FK1) Pseudolite, (FK2) Mounted A-PNT System, and (FK3) Anti-Jam Antenna System (AJAS). These interdependent PNT products assure access to and

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206120A / <i>ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)</i>	
<p>integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these four products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.</p> <p>The overall mission of PM PNT also includes experimentation and demonstration activities aligned with the Secretary of the Army and Chief Staff of the Army modernizations areas. The final acquisition and contracting strategy are under development.</p> <p>Assured PNT consists of:</p> <p>(FJ8) - The Assured PNT funding line originally represented the entire program prior to breaking into four separate funding lines. The FY17-FY22 funding is for PNT System of Systems Architecture (SOSA) Testing and Resiliency and Software Assurance Modification (RSAM) to legacy GPS systems, and enhancements to Army PNT Enterprise Enablers and capabilities.</p> <p>(FJ9) - The Dismounted Assured Positioning, Navigation and Timing (PNT) System is a Size, Weight, Power, and Cost (SWAP-C) optimized military Global Positioning System (GPS) and non-GPS sensor suite that acquires and distributes trusted PNT data to soldier-borne systems.</p> <p>(FK1) - The Pseudolite system provides area protection and PNT Assurance in GPS denied environments by providing terrestrial radio navigation (GPS-like) service in electronically or physically challenged environments using a higher power signal.</p> <p>(FK2) - The Mounted Assured PNT System fuses military GPS with physics based sensors and timing technology to acquire and distribute secure trusted PNT data to tactical client systems on vehicular and watercraft platforms.</p> <p>(FK3) - The Anti-Jam Antenna Systems (AJAS) provides GPS signal point protection and PNT Assurance in challenged environments through Anti-Jam technologies. AJAS enables tactical capabilities through assured signal acquisition in challenged environments.</p> <p>FY 2019 Base funds in the total amount of \$146.300 million are provided to continue the development of the Assured PNT program. The FJ8 funding line accounts for \$59.058 million for PNT System of Systems Architecture (SOSA) Testing, Resiliency and Software Assurance Modification (RSAM) and enhancements to Army PNT enablers and capabilities. The FJ9 funding line accounts for \$15.989 million to complete risk reduction efforts for the Dismounted A-PNT System. The FK1 funding line accounts for \$38.302 million for the completion of the Technology Maturation and Risk Reduction phase for Pseudolite. The FK2 funding line accounts for \$22.816 million to complete risk reduction efforts for the Mounted Assured PNT System. The FK3 funding line accounts for \$10.135 million to complete risk reduction efforts for the AJAS.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206120A / <i>ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	146.300	-	146.300
Total Adjustments	0.000	0.000	146.300	-	146.300
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	146.300	-	146.300

Change Summary Explanation

RDT&E funding increased from \$0.0 million in FY2018 to \$146.300 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A transitions from PE 0604120A beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)				Project (Number/Name) FJ8 / Assured Positioning, Navigation and Timing (PNT)			
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
FJ8: Assured Positioning, Navigation and Timing (PNT)	-	0.000	0.000	59.058	-	59.058	25.499	10.350	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start program. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, Program Element (PE) 1206120A project FJ8 transitioned from PE 0604120A project ED5 beginning in FY19.

A. Mission Description and Budget Item Justification

Assured positioning, navigation and timing (PNT) will provide the Army's ground maneuver forces access to trusted PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 5 Apr 2010, approved the Positioning, Navigation and Timing Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. The Material Development Decision (MDD) was approved on 30 Jul 2013. The Assured PNT draft Capabilities Development Document was validated by Army Requirements Oversight Council (AROC) on 28 Jul 2014.

FY 2019 Base funds in the amount of \$59.058 million are to support PNT System of Systems Architecture (SOSA) Testing and Resiliency and Software Assurance Modification (RSAM) and enhancements to Army PNT Enterprise Enablers and capabilities. The U.S. Army is required to operate in an ever evolving GPS contested environment. The PNT SOSA Testing will allow for Army systems to test developed RSAM software and enable actions to be taken to ensure full operation of Army Forces through RSAM field patches and Assured PNT.

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

	FY 2017	FY 2018	FY 2019
Title: PNT System of System (SOSA) Testing and Resiliency and Software Assurance Modification (RSAM)	-	-	35.435
Description: The effort supports testing of Positioning, Navigation and Timing (PNT) System of Systems Architecture (SOSA) of Army PNT capabilities and Resiliency and Software Assurance Modification (RSAM).			
FY 2019 Plans: PNT SOSA testing and RSAM will complete software development for Defense Advanced GPS Receiver (DAGR) and continue software development for Ground Based GPS Receiver Applications Module (GB-GRAM), to include engineering build testing, formal qualification testing, and risk mitigation efforts for platforms utilizing DAGR and GBGRAM. In addition, DAGR RSAM integration testing efforts will be performed in association with relevant platforms.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ8 / Assured Positioning, Navigation and Timing (PNT)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
RDT&E funding increased from \$0.0 million in FY2018 to \$35.435 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A project FJ8 transitioned from PE 0604120A project ED5 beginning in FY19.				
Title: Assured Positioning, Navigation and Timing Enterprise Enablers		-	-	23.623
Description: This effort will refine Assured PNT Enterprise Enabler requirements and, in appropriate cases, conduct prototyping and technical demonstrations including Alternative Navigation and net-enabled GPS solutions that leverage industry, academia, and the warfighter in an iterative process.				
FY 2019 Plans: FY2019 Base funds will support experimentation, prototyping and technical demonstrations including Alternative Navigation and net-enabled GPS solutions and Assured PNT Enterprise Enablers to inform requirements development and mitigate threat operations.				
FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding increased from \$0.0 million in FY2018 to \$23.623 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A project FJ8 transitioned from PE 0604120A project ED5 beginning in FY19.				
Accomplishments/Planned Programs Subtotals		-	-	59.058
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
The planned acquisition strategy for Positioning, Navigation and Timing (PNT) System of Systems Architecture (SOSA) testing and Resiliency and Software Assurance Modification (RSAM) implementation is to award sole source contracts to the original equipment manufacturers and leverage the Communications Electronics Research Development Engineering Center (CERDEC) to develop and evaluate solutions to enhance the resiliency of Global Positioning System (GPS)-dependent systems operating in evolving contested environments. PNT SOSA testing and RSAM implementation will complete software development for Defense Advanced GPS Receiver (DAGR) and Ground Based GPS Receiver Applications Module (GB-GRAM), to include engineering build testing and formal qualification testing, as well as integration and integration testing, for platforms utilizing DAGR and GB-GRAM engineering builds.				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ8 / Assured Positioning, Navigation and Timing (PNT)

The Assured PNT Enterprise Enabler requirements will be refined by conducting prototyping and technical demonstrations including Alternative Navigation and net-enabled GPS solutions that leverage industry, academia, and the warfighter in an iterative process.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ8 / Assured Positioning, Navigation and Timing (PNT)
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support	Allot	PM PNT : Various	-	-		-		1.449	Oct 2018	-		1.449	Continuing	Continuing	-
Subtotal			-	-		-		1.449		-		1.449	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	-	-		-		4.635	Feb 2019	-		4.635	Continuing	Continuing	-
RSAM - G-GRAM Software Development	SS/CPFF	GCC Technologies : Oakland, MD	-	-		-		4.298	Jan 2019	-		4.298	Continuing	Continuing	-
Assured PNT Enterprise Enablers Engineering and Technical Contracting Services	C/FFP	Various : Various	-	-		-		23.623	Nov 2018	-		23.623	Continuing	Continuing	-
Subtotal			-	-		-		32.556		-		32.556	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Contracting Services	C/FFP	Various : Various	-	-		-		0.454	Nov 2018	-		0.454	Continuing	Continuing	-
Engineering and Technical Government Services	MIPR	C4ISR : Various	-	-		-		1.771	Oct 2018	-		1.771	Continuing	Continuing	-
Subtotal			-	-		-		2.225		-		2.225	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ8 / Assured Positioning, Navigation and Timing (PNT)

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
PNT System of Systems Architecture (SOSA) Testing									SOSA Testing																			
RSAM - DAGR Software Development									DAGR Software Development																			
RSAM - GB-GRAM Software Development									GB-GRAM Software Development																			
Platform Integration Testing									Platform Integration Testing																			
Army Enterprise Enablers									Army Enterprise Enablers																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ8 / Assured Positioning, Navigation and Timing (PNT)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PNT System of Sytems Architecture (SOSA) Testing	1	2019	4	2021
RSAM - DAGR Sotware Development	1	2019	4	2019
RSAM - GB-GRAM Software Development	1	2019	2	2020
Platform Integration Testing	1	2019	4	2021
Army Enterprise Enablers	1	2019	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ9 / Dismounted PNT
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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
FJ9: Dismounted PNT	-	0.000	0.000	15.989	-	15.989	3.060	0.550	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start program. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, Program Element (PE) 1206120A project FJ9 transitioned from PE 0604120A project EH8 beginning in FY19.

A. Mission Description and Budget Item Justification

The Dismounted Assured PNT System acquires, protects, and distributes secure PNT on dismounted platforms. Dismounted A-PNT System is a stand-alone system and will be used in conjunction with the PEO Soldier Nett Warrior System. Dismounted A-PNT System is planned to be modular, scalable form-factor that paces the threats and includes development and integration of GPS and non-GPS sensors. Dismounted A-PNT System includes receiver software capable of acquiring Pseudolite signals resulting in additional protection for military GPS in denied environments and includes a migration path to Military-Code (M-Code) and other future technologies.

FY 2019 Base funds in the amount of \$15.989 million are provided to complete risk reduction/prototyping efforts required to mature critical technologies, finalize documentation required to support the acquisition decision, contracting, and execution of manufacturing development.

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

	FY 2017	FY 2018	FY 2019
Title: Dismounted A-PNT System	-	-	15.989
Description: Risk Reduction efforts to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system.			
FY 2019 Plans: FY2019 Base funds will support the completion of evaluation of the Dismounted small Military-Code (M-Code) capable prototype and the size, weight, and power optimized multi-sensor navigation prototype. Additionally, the funding will also support the initiation of development of the Dismounted Assured PNT system following the acquisition decision.			
FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding increased from \$0.0 million in FY2018 to \$15.989 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A project FJ9 transitioned from PE 0604120A project EH8 beginning in FY19.			
Accomplishments/Planned Programs Subtotals	-	-	15.989

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ9 / Dismounted PNT

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

N/A

Remarks

D. Acquisition Strategy

Assured Positioning, Navigation and Timing (PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The final acquisition and contracting strategy are under development.

The Dismounted A-PNT System acquisition strategy will conduct development, integration and testing of the Dismounted A-PNT System.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ9 / Dismounted PNT
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Government	Allot	PM PNT : APG, MD	-	-		-		0.558	Oct 2018	-		0.558	Continuing	Continuing	-
Project Management Support - Contractor	C/CPFF	Various : Various	-	-		-		0.977	Dec 2018	-		0.977	Continuing	Continuing	-
Subtotal			-	-		-		1.535		-		1.535	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FJ9 transitioned from PE 0604120A project EH8 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Development of a Dismounted M-Code capable prototype	C/CPFF	L3, IEC : Anaheim, CA	-	-		-		1.372	Dec 2018	-		1.372	Continuing	Continuing	-
Development of a small SWAP-C multi sensor navigation prototype	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	-		-		1.181	Dec 2018	-		1.181	Continuing	Continuing	-
Development of sensor fusion algorithm	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	-		-		0.540	Dec 2018	-		0.540	Continuing	Continuing	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	-		-		0.823	Dec 2018	-		0.823	Continuing	Continuing	-
Dismounted A-PNT Manufacturing Development	C/Various	TBD : TBD	-	-		-		7.820	Apr 2019	-		7.820	Continuing	Continuing	-
Subtotal			-	-		-		11.736		-		11.736	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ9 / Dismounted PNT
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			

Remarks
Program Element (PE) 1206120A project FJ9 transitioned from PE 0604120A project EH8 beginning in FY19.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Government	Various	C4ISR : Various	-	-		-		1.516	Nov 2018	-		1.516	Continuing	Continuing	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	-		-		0.949	Dec 2018	-		0.949	Continuing	Continuing	-
Subtotal			-	-		-		2.465		-		2.465	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FJ9 transitioned from PE 0604120A project EH8 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Test Support - Contractor	C/Various	Various : Various	-	-		-		0.253	Dec 2018	-		0.253	Continuing	Continuing	-
Subtotal			-	-		-		0.253		-		0.253	Continuing	Continuing	N/A


Remarks
Program Element (PE) 1206120A project FJ9 transitioned from PE 0604120A project EH8 beginning in FY19.

			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			-	-	0.000	15.989	-	15.989	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ9 / Dismounted PNT

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023											
	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								
Dismounted A-PNT Risk Reduction Activities									[Redacted]																											
Dismounted A-PNT Acquisition Decision													 Acquisition Decision																							
Dismounted A-PNT Manufacturing Development																	[Redacted]																			
Dismounted A-PNT Developmental Testing																									[Redacted]											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FJ9 / Dismounted PNT

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Dismounted A-PNT Risk Reduction Activities	1	2019	3	2019
Dismounted A-PNT Acquisition Decision	3	2019	3	2019
Dismounted A-PNT Manufacturing Development	3	2019	3	2021
Dismounted A-PNT Developmental Testing	4	2020	2	2021

Note

Program Element (PE) 1206120A project FJ9 transitioned from PE 0604120A project EH8 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK1 / PSEUDOLITES PNT
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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
FK1: PSEUDOLITES PNT	-	0.000	0.000	38.302	-	38.302	18.106	6.529	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start program. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, Program Element (PE) 1206120A project FK1 transitioned from PE 0604120A project EH9 beginning in FY19.

A. Mission Description and Budget Item Justification

Highly accurate Positioning, Navigation and Timing (PNT) data is a key enabler and a cross cutting capability for Army forces to execute their mission. The Army requires ground maneuver forces access to trusted PNT information under conditions where space-based PNT may be limited or denied to maintain its Global Positioning System (GPS) military advantage on the battlefield. The current GPS capability is a fixed frequency system which is vulnerable to current and emerging threats and field conditions.

Pseudolite (satellite-like transmitters) assure GPS access and integrity by providing PNT via terrestrial and airborne-based radio navigation GPS transmitters in electronically or physically challenged environments using a higher power signal. Area protection is provided through the deployment of Pseudolite transmitters supporting a Brigade Combat Team area of operations. Pseudolite supports continued operations of PNT-enabled systems such as Blue Force Tracker, Communications Networks and Precision Guided Munitions. Pseudolite consists of three segments:

1. Pseudolite Transmitter segment provides terrestrial and airborne radio navigation (GPS-like) service in electronically or physically challenged environments using a high power signal.
2. Command and Control (C2) segment to control the Pseudolite transmitters on the battlefield.
3. Receiver segment, which will develop software upgrades to current and future military GPS receivers to receive and process the Pseudolite signals.

FY 2019 Base funds in the amount of \$38.302 million are provided to complete the Technology Maturation and Risk Reduction Phase required to mature critical technologies, finalize documentation required to support the acquisition decision, contracting, and execution of manufacturing development.

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

	FY 2017	FY 2018	FY 2019
Title: Pseudolite	-	-	38.302
Description: Pseudolite Technology Maturation and Risk Reduction to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system.			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK1 / PSEUDOLITES PNT
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<p>FY19 Funds will complete the Technology Maturation and Risk Reduction prototyping and testing effort for the Pseudolite transmitter. In addition, efforts will complete the development of prototype software code for the remote Command and Control of Pseudolites over a tactical network. Other efforts include: software upgrades to legacy receivers and completion of software development for Precision Guided Munitions to communicate with the Pseudolite transmitter; Security Certification requirements and initial activities toward achievement; implementation of modifications and upgrades to prototypes based on testing results; integration development efforts with Pseudolite Ground and Air host platforms; acquisition decision, contracting, and execution of manufacturing development.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding increased from \$0.0 million in FY2018 to \$38.302 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A project FK1 transitioned from PE 0604120A project EH9 beginning in FY19.</p>			
Accomplishments/Planned Programs Subtotals	-	-	38.302

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

Remarks

D. Acquisition Strategy
Assured Positioning, Navigation and Timing (PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The final acquisition and contracting strategy are under development.

The Pseudolite Technology Maturation and Risk Reduction (TMRR) acquisition strategy was approved by the Milestone Decision Authority and Milestone A was successfully completed in May 2015. The Pseudolite product is currently in the TMRR Phase of the acquisition life-cycle.

The TMRR Acquisition Strategy for Pseudolites includes: 1) Technology maturation of the Transmitter segment through the use of two prototyping, cost-plus fixed fee (CPFF) contracts; 2) Command and Control (C2) segment will leverage the development by other DoD agencies to the greatest extent possible; 3) Receiver segment will make the use of multiple contracts through existing vehicles for Pseudolite Receiver software prototype development.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK1 / PSEUDOLITES PNT

After successful acquisition decision, development, integration and testing of the Pseudolite solution will begin.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK1 / PSEUDOLITES PNT
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Contractor	C/CPFF	Various : Various	-	-		-		1.618	Dec 2018	-		1.618	Continuing	Continuing	-
Subtotal			-	-		-		1.618		-		1.618	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK1 transitioned from PE 0604120A project EH9 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Pseudolite Prototype - Transmitter Contractor 1	C/CPFF	Datapath - Rockwell Collins : Cedar Rapids IA	-	-		-		2.546	Dec 2018	-		2.546	Continuing	Continuing	-
Pseudolite Prototype - Transmitter Contractor 2	C/CPFF	L-3 Communications : Anaheim, CA	-	-		-		2.547	Dec 2018	-		2.547	Continuing	Continuing	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	-		-		2.992	Nov 2018	-		2.992	Continuing	Continuing	-
Pseudolite Command & Control	C/Various	PEO Ammo & PM EW : Various	-	-		-		3.922	Dec 2018	-		3.922	Continuing	Continuing	-
OEM Platform Integration Development for Air Platform	SS/CPFF	PEO Aviation : Various	-	-		-		2.498	Dec 2018	-		2.498	Continuing	Continuing	-
OEM Platform Integration Development for Ground Platform 1, Platform 2, and Platform 3	SS/CPFF	Various : Various	-	-		-		1.000	Dec 2018	-		1.000	Continuing	Continuing	-
PM Platform Integration Development	MIPR	Various : Various	-	-		-		0.635	Dec 2018	-		0.635	Continuing	Continuing	-
Pseudolite Manufacturing Development	C/Various	TBD : TBD	-	-		-		13.758	Apr 2019	-		13.758	Continuing	Continuing	-
Subtotal			-	-		-		29.898		-		29.898	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK1 / PSEUDOLITES PNT
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			

Remarks
Program Element (PE) 1206120A project FK1 transitioned from PE 0604120A project EH9 beginning in FY19.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	-		-		6.374	Dec 2018	-		6.374	Continuing	Continuing	-
Subtotal			-	-		-		6.374		-		6.374	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK1 transitioned from PE 0604120A project EH9 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Pseudolite Prototype Lab and Field Testing	MIPR	Various : Various	-	-		-		0.412	Dec 2018	-		0.412	Continuing	Continuing	-
Subtotal			-	-		-		0.412		-		0.412	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK1 transitioned from PE 0604120A project EH9 beginning in FY19.

	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	-	-	0.000	38.302	-	38.302	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK1 / PSEUDOLITES PNT

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Pseudolite (PL) Prototype Development Contractor 1									██████████																			
									PL Prototype Dev Ctr 1																			
Pseudolite (PL) Prototype Development Contractor 2									██████████																			
									PL Prototype Dev Ctr 2																			
Pseudolite (PL) Command and Control Development & Test									██																			
									PL Command and Control Dev & Test																			
Pseudolite (PL) Receiver Development & Test									██																			
									PL Receiver Development & Test																			
Pseudolite (PL) Acquisition Decision									▲ 1 Acquisition Decision																			
									Manufacturing Development																			
Pseudolite (PL) Manufacturing Development									██																			
									Manufacturing Development																			
Pseudolite (PL) Critical Design Review (CDR)									▲ 2 CDR																			
									Developmental Testing																			
Pseudolite (PL) Developmental Testing													██████████															
									Developmental Testing																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK1 / PSEUDOLITES PNT

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Pseudolite (PL) Prototype Development Contractor 1	1	2019	2	2019
Pseudolite (PL) Prototype Development Contractor 2	1	2019	2	2019
Pseudolite (PL) Command and Control Development & Test	1	2019	4	2021
Pseudolite (PL) Receiver Development & Test	1	2019	4	2021
Pseudolite (PL) Acquisition Decision	3	2019	3	2019
Pseudolite (PL) Manufacturing Development	3	2019	3	2021
Pseudolite (PL) Critical Design Review (CDR)	1	2020	1	2020
Pseudolite (PL) Developmental Testing	4	2020	2	2021

Note

Program Element (PE) 1206120A project FK1 transitioned from PE 0604120A project EH9 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK2 / MOUNTED PNT
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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
FK2: MOUNTED PNT	-	0.000	0.000	22.816	-	22.816	14.698	7.594	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start program. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, Program Element (PE) 1206120A project FK2 transitioned from PE 0604120A project EJ2 beginning in FY19.

A. Mission Description and Budget Item Justification

The Mounted Assured Positioning, Navigation and Timing (A-PNT) System provides PNT data and is a key enabler and a cross cutting capability for Army ground maneuver forces to execute their mission. Army ground maneuver Forces require access to trusted PNT information under conditions where space-based PNT may be limited or denied to maintain its Global Positioning System (GPS) military advantage on the battlefield. The current GPS capability is a fixed frequency system which is vulnerable to current and emerging threats and field condition.

Mounted A-PNT is a scalable form-factor that distributes PNT data to multiple devices (client systems) on mounted platforms. The system fuses military GPS with physics-based sensors and timing technology to provide trusted PNT data, which allows the Soldier to operate in GPS degraded or denied environments. Mounted APNT System includes receiver software capable of acquiring Pseudolite signals resulting in additional protection for military GPS in denied environments and paces the threat by including a migration path to Military Code (M-Code) and other future technologies.

FY 2019 Base funds in the amount of \$22.816 million are provided to complete risk reduction/prototyping efforts required to mature critical technologies, finalize documentation required to support the acquisition decision, contracting, and execution of manufacturing development.

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

	FY 2017	FY 2018	FY 2019
Title: Mounted A-PNT System	-	-	22.816
Description: Risk Reduction efforts to reduce technology risk and to determine the appropriate set of technologies to be integrated into the system.			
FY 2019 Plans: FY2019 Base funds will support completion of focused prototyping with industry and Federally Funded Research & Development Center partners, Army Military Code (M-Code) development, and early client system integration efforts in the system integration lab. The funds will also initiate the Mounted Assured PNT manufacturing development.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK2 / MOUNTED PNT
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
RDT&E funding increased from \$0.0 million in FY2018 to \$22.816 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A project FK2 transitioned from PE 0604120A project EJ2 beginning in FY19.			
Accomplishments/Planned Programs Subtotals	-	-	22.816

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

N/A

Remarks

D. Acquisition Strategy

Assured Positioning, Navigation and Timing (A-PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The final acquisition and contracting strategy are under development.

The Mounted A-PNT System acquisition strategy will conduct development, integration and testing of the Mounted A-PNT System.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK2 / MOUNTED PNT
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Government	Allot	PM PNT : APG, MD	-	-		-		0.854	Nov 2018	-		0.854	Continuing	Continuing	-
Project Management Support - Contractor	C/CPFF	Various : Various	-	-		-		0.742	Dec 2018	-		0.742	Continuing	Continuing	-
Subtotal			-	-		-		1.596		-		1.596	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK2 transitioned from PE 0604120A project EJ2 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Prototype Development Contractor 1	C/CPFF	Rockwell Collins : Cedar Rapids, IA	-	-		-		1.071	Dec 2018	-		1.071	Continuing	Continuing	-
Prototype Development Contractor 2	C/CPFF	Northrup Grumman : San Diego, CA	-	-		-		0.994	Dec 2018	-		0.994	Continuing	Continuing	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	-		-		2.695	Dec 2018	-		2.695	Continuing	Continuing	-
Development of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	-		-		4.774	Dec 2018	-		4.774	Continuing	Continuing	-
Mounted A-PNT Manufacturing Development	C/Various	TBD : TBD	-	-		-		6.266	Apr 2019	-		6.266	Continuing	Continuing	-
Subtotal			-	-		-		15.800		-		15.800	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK2 transitioned from PE 0604120A project EJ2 beginning in FY19.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK2 / MOUNTED PNT
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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Government	Various	C4ISR : Various	-	-		-		1.542	Nov 2018	-		1.542	Continuing	Continuing	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	-		-		3.405	Dec 2018	-		3.405	Continuing	Continuing	-
Subtotal			-	-		-		4.947		-		4.947	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK2 transitioned from PE 0604120A project EJ2 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Test Support - Contractor	C/CPFF	Various : Various	-	-		-		0.473	Dec 2018	-		0.473	Continuing	Continuing	-
Subtotal			-	-		-		0.473		-		0.473	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK2 transitioned from PE 0604120A project EJ2 beginning in FY19.

	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	-	-	0.000	22.816	-	22.816	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK2 / MOUNTED PNT

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Mounted A-PNT Risk Reduction Activities									Risk Reduction Activities																			
Mounted A-PNT Acquisition Decision																	1 Acquisition Decision											
Mounted A-PNT Manufacturing Development									Manufacturing Development																			
Mounted A-PNT Critical Design Review													2 CDR															
Mounted A-PNT Developmental Testing																	Developmental Testing											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK2 / MOUNTED PNT

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mounted A-PNT Risk Reduction Activities	1	2019	3	2019
Mounted A-PNT Acquisition Decision	3	2019	3	2019
Mounted A-PNT Manufacturing Development	3	2019	3	2022
Mounted A-PNT Critical Design Review	4	2020	4	2020
Mounted A-PNT Developmental Testing	3	2021	1	2022

Note

Program Element (PE) 1206120A project FK2 transitioned from PE 0604120A project EJ2 beginning in FY19.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK3 / ANTI-JAM ANTENNA PNT
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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
FK3: ANTI-JAM ANTENNA PNT	-	0.000	0.000	10.135	-	10.135	19.501	8.051	1.653	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start program. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, Program Element (PE) 1206120A project FK3 transitioned from PE 0604120A project EJ3 beginning in FY19.

A. Mission Description and Budget Item Justification

The Anti-Jam Antenna System (AJAS) provides point protection by steering electronic nulls at interference sources or beams at valid signal sources. This enables continuous GPS signal acquisition and tracking in a navigation warfare (jamming) environment. The AJAS is deployed as a scalable component accessory to the Mounted Assured Positioning, Navigation and Timing (PNT) System.

FY 2019 Base funds in the amount of \$10.135 million are provided to complete risk reduction efforts required to mature critical technologies, finalize documentation required to support the acquisition decision, contracting, and execution of manufacturing development.

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

	FY 2017	FY 2018	FY 2019
Title: Anti-Jam Antenna System	-	-	10.135
Description: Risk reduction activities associated with the Anti-Jam Antenna System (AJAS) is to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system.			
FY 2019 Plans: FY 2019 Base funds will provide support to risk reduction activities to include: development of a Systems Integration Lab used for evaluation of system interoperability and platform integration; evaluation of commercial AJAS using modeling and simulation; complete development of AJAS software models; finalize development/modification of commercial AJAS; Anechoic Chamber testing; live-sky testing and the initiation of manufacturing development.			
FY 2018 to FY 2019 Increase/Decrease Statement: RDT&E funding increased from \$0.0 million in FY2018 to \$10.135 million in FY2019. In accordance with Section 239 of Title 10, U.S.C., the FY 2018 President's Budget established new Program Elements (PE) to account for all of the Department's Space Major Force Program (MFP)-12 programs. To comply with this requirement, PE 1206120A project FK3 transitioned from PE 0604120A project EJ3 beginning in FY19.			
Accomplishments/Planned Programs Subtotals	-	-	10.135

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK3 / ANTI-JAM ANTENNA PNT

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

N/A

Remarks

D. Acquisition Strategy

Assured Positioning, Navigation and Timing (A-PNT) is a system comprised of products including Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and Anti-Jam Antenna System (AJAS), to assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Program Manager (PM) PNT manages these products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System, and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

The final acquisition and contracting strategy are under development.

The AJAS acquisition strategy will conduct development, integration and testing of the AJAS.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK3 / ANTI-JAM ANTENNA PNT
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Project Management Support - Government	Allot	PM PNT : APG, MD	-	-		-		0.412	Nov 2018	-		0.412	Continuing	Continuing	-
Project Management Support - Contractor	C/CPFF	Various : Various	-	-		-		0.115	Dec 2018	-		0.115	Continuing	Continuing	-
Subtotal			-	-		-		0.527		-		0.527	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK3 transitioned from PE 0604120A project EJ3 beginning in FY19.

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Development of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Lab : APG, MD	-	-		-		0.525	Dec 2018	-		0.525	Continuing	Continuing	-
Anti-Jam Antenna Hardware Simulation and Evaluation	MIPR	CERDEC - Command and Integration Directorate : APG, MD	-	-		-		0.204	Dec 2018	-		0.204	Continuing	Continuing	-
Early Platform Integration and Evaluation	MIPR	Various : Various	-	-		-		0.612	Dec 2018	-		0.612	Continuing	Continuing	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	-	-		-		1.042	Dec 2018	-		1.042	Continuing	Continuing	-
Anti-Jam Antenna Manufacturing Development	C/Various	TBD : TBD	-	-		-		4.863	Apr 2019	-		4.863	Continuing	Continuing	-
Subtotal			-	-		-		7.246		-		7.246	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK3 transitioned from PE 0604120A project EJ3 beginning in FY19.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK3 / ANTI-JAM ANTENNA PNT
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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Engineering and Technical Services - Government	Various	C4ISR : Various	-	-		-		0.442	Nov 2018	-		0.442	Continuing	Continuing	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	-		-		1.325	Dec 2018	-		1.325	Continuing	Continuing	-
Subtotal			-	-		-		1.767		-		1.767	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK3 transitioned from PE 0604120A project EJ3 beginning in FY19.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Anti-Jam Antenna Live Sky Demo and Anechoic Chamber Test	MIPR	CERDEC - Command Power and Integration Directorate : APG, MD	-	-		-		0.595	Dec 2018	-		0.595	Continuing	Continuing	-
Subtotal			-	-		-		0.595		-		0.595	Continuing	Continuing	N/A

Remarks
Program Element (PE) 1206120A project FK3 transitioned from PE 0604120A project EJ3 beginning in FY19.

	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	-	-	0.000	10.135	-	10.135	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK3 / ANTI-JAM ANTENNA PNT

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Anti-Jam Antenna Risk Reduction Activities									Risk Reduction Activities																			
Anti-Jam Antenna Acquisition Decision																	1 Acquisition Decision											
Anti-Jam Antenna Manufacturing Development									Manufacturing Development																			
Anti-Jam Antenna Critical Design Review													2 CDR															
Anti-Jam Antenna Developmental Testing																	Developmental Testing											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206120A / ASSURED POSITIONING, NAVIGATION AND TIMING (PNT)	Project (Number/Name) FK3 / ANTI-JAM ANTENNA PNT

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Anti-Jam Antenna Risk Reduction Activities	1	2019	3	2019
Anti-Jam Antenna Acquisition Decision	3	2019	3	2019
Anti-Jam Antenna Manufacturing Development	3	2019	3	2022
Anti-Jam Antenna Critical Design Review	4	2020	4	2020
Anti-Jam Antenna Developmental Testing	3	2021	1	2022

Note

Program Element (PE) 1206120A project FK3 transitioned from PE 0604120A project EJ3 beginning in FY19.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206308A / <i>Army Missile Defense Systems Integration</i>
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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	-	0.000	20.432	38.319	-	38.319	22.277	30.653	25.932	24.194	0.000	161.807
FE5: <i>Space And Missile Defense Integration</i>	-	0.000	15.966	17.225	-	17.225	17.031	20.081	20.569	19.502	0.000	110.374
FE6: <i>Army Space System Enhancement/Integration</i>	-	0.000	4.466	21.094	-	21.094	5.246	10.572	5.363	4.692	0.000	51.433

A. Mission Description and Budget Item Justification

- PE 0603308A project 990 transition to PE 1206308A project FE5 beginning in FY 2018.
- PE 0603308A project EB7 transition to PE 1206308A project FE6 and PE 1205117A project FG3 beginning in FY 2018.

This program element funds space systems integration efforts performed by the US Army Space and Missile Defense Command/ Army Forces Strategic Command (USASMDC/ARSTRAT) and the Program Executive Office for Intelligence, Electronic Warfare (PEO IEW&S).

Project FE5 funds USASMDC/ARSTRAT to integrate warfighting concepts and technologies, validate concepts, and identify capabilities needed to implement the validated concepts, and develop DOTMLPF solutions to realize those space and high altitude related capabilities. Provide engineering support to the Joint Friendly Force Tracking (J-FFT) Mission Management Center (MMC) through an associated test-bed for both operational and developmental injection and integration of real-time J-FFT information into the Common Operating Picture (COP) for Combatant Commanders (COCOMs), Joint Task Forces (JTFs), and Coalition Partners. The MMC injects real-time J-FFT information into the COP for COCOMs, JTFs and Coalition partners. USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DoD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMDC/ARSTRAT as the lead USSTRATCOM component command for Friendly Force Tracking (FFT).

Project FE6: Details of this program are reported in accordance with Title 10, United States Code, Section 119 (a)(1).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206308A / <i>Army Missile Defense Systems Integration</i>
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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	20.432	24.127	-	24.127
Current President's Budget	0.000	20.432	38.319	-	38.319
Total Adjustments	0.000	0.000	14.192	-	14.192
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	14.192	-	14.192

Change Summary Explanation

PE 0603308A project 990 transition to PE 1206308A project FE5 beginning in FY 2018.

PE 0603308A project EB7 transition to PE 1206308A project FE6 and PE 1205117A project FG3 beginning in FY 2018.

FY 2019 funding realignment to match acquisition schedule and equipment purchases required by the approved acquisition strategy consistent with the FY 2017 development contract award.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration				Project (Number/Name) FE5 / Space And Missile Defense Integration			
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
FE5: Space And Missile Defense Integration	-	0.000	15.966	17.225	-	17.225	17.031	20.081	20.569	19.502	0.000	110.374
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

PE 0603308A project 990 transition to PE 1206308A project FE5 beginning in FY 2018.

A. Mission Description and Budget Item Justification

USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space and ground-based midcourse defense (GBMD), the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the U.S. Strategic Command (USSTRATCOM). Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designate USASMDC/ARSTRAT as the Army specified proponent for Global Missile Defense and Space/High Altitude capabilities. As the Army proponent for space, high altitude and GBMD, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize the GMD capabilities. As the Army integrator for global missile defense, USASMDC/ARSTRAT is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM to execute its global missile defense responsibilities.

Project FE5 funds United States Army Space and Missile Command/Army Strategic Command (USASMDC/ARSTRAT) efforts to develop, analyze and mature warfighting concepts, and conduct warfighting experiments for space and high altitude capabilities. USASMDC/ARSTRAT is the proponent for space / high altitude capabilities and is responsible for determining and integrating Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF-P) for the Army. The program also funds development and integration of new data sources and data services into the Joint Friendly Force Tracking Mission Management Center. The Mission Management Center (MMC) injects real-time Joint Friendly Force Tracking (J-FFT) information into the Common Operating Picture for Combatant Commands (COCOMs), Joint Task Forces (JTFs) and Coalition partners. USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DOD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMDC/ARSTRAT as the lead USSTRATCOM component command for J-FFT.

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

	FY 2017	FY 2018	FY 2019
Title: : Architecture Development, Wargames and Demonstrations	-	13.016	10.440
Description: Funding is provided for the following efforts			
FY 2018 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration	Project (Number/Name) FE5 / Space And Missile Defense Integration

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

	FY 2017	FY 2018	FY 2019
<p>Plan, develop, and execute architectures and combat development solutions for Army integration of space systems, space control capabilities, missile defense and high altitude systems. Represent Army positions and defend Army equities relative to space and high altitude domains in Joint/DoD and inter-Service activities; e.g., Executive Agent for Space Program Assessments, etc. Plan and execute wargames to evaluate emerging concepts within the space and high altitude domains as well as participate and provide support to Army and Joint wargames and experiments where space and high altitude capabilities and technologies can be integrated and evaluated in the most realistic operating environment possible. Ensure that space, high altitude and cyber capability gaps are identified and capabilities are correctly represented so that the Army's use of these capabilities is explored and where possible, exploited. Develop space modernization strategies and sponsor exploration of future space and high altitude warfighting concepts. USASMDC/ARSTRAT will continue efforts to enhance the resiliency and effectiveness of critical space-based assets and JCIDS capability development activities for space superiority, high altitude persistent platforms, nano-satellites and tactical launch systems. Products scheduled to be delivered in FY18 include Army Cyberspace Analysis; Space Superiority Analysis of Alternatives and Cost -Benefit Analysis updates: Overhead Persistence Infrared (OPIR) Analysis; Assessment of Hostile use of Space Force Enhancement; and Position Navigation Timing (PNT) analysis. Support TAA 21-25 Resourcing Phase and commence TAA 22-26 Capability Demand Analysis Phase. TAA is a phased force structure analysis process that defines the required Army force structure within end strength and accounts for the military and DA Civilian requirements and authorizations necessary to comply with DOD guidance. Participate in the Army's FDU process 19-2 and 20-1. FDUs Include capabilities development, capabilities determination, requirements approval, and implementation decisions. Additionally during the TAA cycle new Rules of Allocation (ROA) will be developed to ensure SRC40 units are properly accounted for in the future POM force.</p> <p>FY 2019 Plans:</p> <p>Plan, develop, and execute architectures and combat development solutions for Army integration of space systems, space control capabilities, and high altitude systems. As the Army Executive Agent for Space Program Assessments, represent Army positions and defend Army equities relative to space and high altitude domains in Joint/DoD and inter-Service forums. Plan and execute wargames to evaluate emerging concepts within the space and high altitude domains as well as participate and provide support to Army and Joint wargames and experiments where space and high altitude capabilities and technologies can be integrated and evaluated in the most realistic operating environment possible. Ensure that space, high altitude and cyber capability gaps are identified and capabilities are correctly represented so that the Army's use of these capabilities is explored and where possible, exploited. Develop space modernization strategies and sponsor exploration of future space and high altitude warfighting concepts. USASMDC/ARSTRAT Future Warfare Center (FWC) will continue efforts to enhance the resiliency and effectiveness of critical space-based assets and JCIDS capability development activities for space superiority, high altitude persistent platforms, nano-satellites and tactical launch systems. Will develop Space and High Altitude JCIDS documents including Initial Capabilities Documents (ICD) or Capability Development Documents (CDD), and Capability Production Documents (CPD) to update system Operational Requirements Documents (ORD). Develop a space superiority Capability Production Document (CPD) and continue</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration	Project (Number/Name) FE5 / Space And Missile Defense Integration		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
to develop the JCIDS documentation required to Integrate space and high altitude capabilities into Multi-Domain Task Force (MDTF).				
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease was due to establishing a dedicated requirement for Force Development activities.				
Title: Joint Friendly Force Tracking (J-FFT) Testbed		-	2.950	2.725
Description: Funding is provided for the following efforts				
FY 2018 Plans: Support the full integration of Joint Friendly Force Tracking (J-FFT) into Combat Commanders' friendly force tracking requirements. Continue to develop the J-FFT Testbed for its use in integrating hardware and software prior to its deployment to the field. Leverage network enabled command and control system enhancements and continue to support development of Friendly Force Tracking (FFT) capabilities for deployed and coalition forces. Continue to transition Force Tracking Advanced Management System (FTAMS) to FFT-Mission Management Center (MMC). The J-FFT Division coordinates and executes USSTRATCOM-directed FFT tasks in order to assure continuous 24/7 FFT data services support to authorized users to include the Combatant Commands, the Services, agencies, allies, and coalition partners in order to improve their situational awareness (SA), enhance command and control (C2) to reduce fratricide in combat, homeland defense, civil and contingency operations.				
FY 2019 Plans: Support the full integration of Joint Friendly Force Tracking (J-FFT) into Combat Commanders' friendly force tracking requirements. Continue to develop the J-FFT Testbed for its use in integrating hardware and software prior to its deployment to the field. Leverage network enabled command and control system enhancements and continue to support development of Friendly Force Tracking (FFT) capabilities for deployed and coalition forces. Continue to transition Force Tracking Advanced Management System (FTAMS) to FFT-Mission Management Center (MMC). The J-FFT Division coordinates and executes USSTRATCOM-directed FFT tasks in order to assure continuous 24/7 FFT data services support to authorized users to include the Combatant Commands, the Services, agencies, allies, and coalition partners in order to improve their situational awareness (SA), enhance command and control (C2) to reduce fratricide in combat, homeland defense, civil and contingency operations. Gain Army approval of a Joint Capabilities Integration and Development System (JCIDS) document for JFFT.				
FY 2018 to FY 2019 Increase/Decrease Statement: Minimal decreased due to test-bed requirements.				
Title: Organizational Development as Part of the SRC40 Prophecy Mission		-	-	1.450
FY 2019 Plans:				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration	Project (Number/Name) FE5 / Space And Missile Defense Integration		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<p>Participate in the Force Design Update (FDU) process. FWC will participate in the recurring process used to gain HQDA approval of organizational structure changes and designs through the FDU and FDU Jr. processes. This includes the development of Operational & Organizational (O&O) Concept Papers, Organization Design Papers, Cost Benefit Analyses, Unit Reference Sheets (URS), and Manpower Requirements Criteria (MARC) determination. Participate in the Total Army Analysis (TAA), the Army's annual process to examine the projected Army force qualitatively and quantitatively. SMDC/ARSTRAT will support TAA Rule of Allocation (ROA) development, Capability Demand Analysis (CDA) and Resourcing phases to ensure SRC40 units are properly accounted for in the future POM force. This is performed to analyze the projected Army Force against future demands and levels of funding/authorizations, in order to build the Program Objective Memorandum (POM) Force. SMDC/ARSTRAT FWC will review the SMDC Troops, Organization and Equipment (TOE) requirements documents conducted as part of a cyclic process as well when needed during other Force Design processes (i.e. Basis of Issue Plan (BOIP) Modernization Path (MODPATH) reviews, Notification of Change (NOFC) reviews, SSN-LIN Automated Management and Integrating System (SLAMIS) reviews, etc.). Participate in BOIP Development. BOIP Development is collection of processes including the cyclic review of Army-wide BOIPs under development, development of Feeder Data for SMDC proponent item BOIPs, and validation of BOIP MODPATHs to SMDC TOEs. Complete the Space Forces Force Structure Review (FSR) which is a CBA-like structured three-phased process consisting of a Needs Analysis (NA), Gap Analysis (GA), and Solutions Analysis (SA) to identify and document organizational based capability needs and gaps, develop a prioritized list of those gaps, and identify potential materiel and/or non-materiel solutions.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: New requirement for FY 2019.</p>				
<p>Title: Position, Navigation, and Timing Navigation Warfare (PNT/NAVWAR)</p> <p>FY 2019 Plans: Identify and advocate for positioning, navigation, and timing (PNT) and Navigation Warfare (NAVWAR) requirements through CDR USSTRATCOM to the joint staff to establish and formalize joint NAVWAR requirements, in the Joint Capabilities Integration and Development System (JCIDS) process.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: New requirement for FY 2019.</p>		-	-	2.610
Accomplishments/Planned Programs Subtotals		-	15.966	17.225
C. Other Program Funding Summary (\$ in Millions)				
N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / <i>Army Missile Defense Systems Integration</i>	Project (Number/Name) FE5 / <i>Space And Missile Defense Integration</i>
C. Other Program Funding Summary (\$ in Millions)		
Remarks N/A		
D. Acquisition Strategy N/A		
E. Performance Metrics N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration	Project (Number/Name) FE5 / Space And Missile Defense Integration
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Cost Category Item Name	TBD	TBD : TBD	-	-		-		17.225		-		17.225	0.000	17.225	-
Subtotal			-	-		-		17.225		-		17.225	0.000	17.225	N/A

Remarks
N/A

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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			
Space Forces Development	TBD	To be Determined : To Be Determined	-	-		15.966		-		-		-	0.000	15.966	-
Subtotal			-	-		15.966		-		-		-	0.000	15.966	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			-	-	15.966	17.225	-	17.225	0.000	33.191

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration	Project (Number/Name) FE5 / Space And Missile Defense Integration

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
Development of SMDC MMC Force Tracking					LABEL																											
Jericho Thunder Analysis Support																																
SMDC NanoSat Analysis (SNAP, KE)																																
Space Superiority Joint Architecture Analysis																																
Force Design Assessment of Army Forces																																
NAVWAR/PNT Gap Analysis and Advocacy																																
Implications of the Emerging "Third" Offset Strategy for SMDC Space																																
Space Simulation Support to TRADOC ARCIC Experimentation																																
Common Ground Station Operating Concept and Requirement Document																																
NAVWAR Defense/Attack Operating Concepts and Requirements Documentation																																
Army Enduring JFFT Development																																
High Altitude Persistent Platform Capability Development Document																																
Counter ISR Capability Development																																

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration	Project (Number/Name) FE5 / Space And Missile Defense Integration

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Space Operations Multi-Domain Environment Analysis																												
Space Superiority Capability Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A / <i>Army Missile Defense Systems Integration</i>	Project (Number/Name) FE5 / <i>Space And Missile Defense Integration</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Development of SMDC MMC Force Tracking	1	2018	4	2023
Jericho Thunder Analysis Support	1	2019	4	2022
SMDC NanoSat Analysis (SNAP, KE)	1	2019	4	2022
Space Superiority Joint Architecture Analysis	1	2018	4	2023
Force Design Assessment of Army Forces	1	2019	4	2022
NAVWAR/PNT Gap Analysis and Advocacy	1	2018	4	2023
Implications of the Emerging "Third" Offset Strategy for SMDC Space	1	2019	2	2019
Space Simulation Support to TRADOC ARCIC Experimentation	1	2018	4	2023
Common Ground Station Operating Concept and Requirement Document	1	2019	3	2019
NAVWAR Defense/Attack Operating Concepts and Requirements Documentation	1	2018	4	2023
Army Enduring JFFT Development	1	2018	4	2023
High Altitude Persistent Platform Capability Development Document	1	2018	4	2023
Counter ISR Capability Development	3	2017	4	2023
Space Operations Multi-Domain Environment Analysis	4	2017	4	2023
Space Superiority Capability Development	1	2018	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 1206308A / Army Missile Defense Systems Integration				Project (Number/Name) FE6 / Army Space System Enhancement/ Integration			
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
FE6: Army Space System Enhancement/Integration	-	0.000	4.466	21.094	-	21.094	5.246	10.572	5.363	4.692	0.000	51.433
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1). Funding line is shared between USA Space and Missile Defense Command (SMDC) and Program Executive Office Intelligence, Electronic Warfare and Sensors (PEO IEW&S) starting in FY2018. Funding transferred from PE 0603308A project EB7 transition to PE 1206308A project FE6 and PE 1205117A project FG3 beginning in FY 2018.