Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	189.386	121.060	-	121.060	86.534	84.198	112.487	93.340	0.000	687.005
AE6: *Strategic Long Range Cannon Advanced Technology*	-	0.000	77.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	77.000
AE8: *Land-Based Anti-Ship Missile (LBASM) Advanced Tech*	-	0.000	6.761	10.057	-	10.057	15.892	26.269	18.350	0.000	0.000	77.329
AE9: *Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech*	-	0.000	14.149	10.077	-	10.077	0.000	0.000	0.000	0.000	0.000	24.226
AF2: *Long Range Maneuverable Fires (LRMF) Advanced Tech**	-	0.000	0.000	0.000	-	0.000	0.000	0.000	11.199	11.313	0.000	22.512
AF4: *Missile Simulation Advanced Technology*	-	0.000	0.273	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.273
AG3: *Extended Range Cannon Artillery (ERCA) Adv Tech*	-	0.000	19.992	18.419	-	18.419	3.237	3.362	2.997	5.078	0.000	53.085
AG5: *Extended Range Artillery Munition Suite Adv Tech*	-	0.000	35.600	50.227	-	50.227	41.207	30.622	30.886	27.891	0.000	216.433
AG7: *Energetic Materials and Adv Processing Adv Tech*	-	0.000	2.040	2.079	-	2.079	2.121	2.163	0.000	0.000	0.000	8.403
AH3: *Single Multi-mission Attack Missile Adv Tech*	-	0.000	5.683	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.683
BO8: *Long Range Precision Fires Advanced Tech (CA)*	-	0.000	15.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.000
BS3: *Strategic Missile Advanced Technology*	-	0.000	12.888	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.888
BY2: *Advanced Hypersonic Technology*	-	0.000	0.000	30.201	-	30.201	24.077	21.782	49.055	49.058	0.000	174.173

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2021

Note

In Fiscal Year (FY) 2020, funding in this Program Element (PE) was realigned with continuity of effort from the following PEs:

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*

* 0603004A (Weapons and Munitions Advanced Technology)
* 0603313A (Missile and Rocket Advanced Technology)

A. Mission Description and Budget Item Justification

This PE matures and demonstrates Long Range Precision Fires (LRPF) technologies to destroy, neutralize, or suppress the enemy by cannon artillery and missile fire and enable integration of fire support assets into combined arms operations. Major Focus Areas for LRPF Science and Technology include: Missiles, Cannon Artillery, and Supporting LRPF Technologies covering Strategic, Operational and Tactical Lines of Effort. LRPF Missiles Advanced Development matures and demonstrates a broad range of Missile technologies to enhance Army integrated LRPF capabilities at extended range. Cannon Artillery Advanced Development matures and demonstrates critical technologies to increase range, precision, and both point and area effects for cannon artillery. Supporting LRPF Technologies Advanced Development matures and demonstrates a broad range of component technologies to address weapon cost drivers and enhance performance of future LRPF munitions and systems.

Work in this PE complements PE 0602147A Long Range Precision Fires Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work is performed by the United States Army Futures Command (AFC).

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	174.386	118.682	-	118.682
Current President's Budget	0.000	189.386	121.060	-	121.060
Total Adjustments	0.000	15.000	2.378	-	2.378
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	15.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	2.378	-	2.378

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: BO8: *Long Range Precision Fires Advanced Tech (CA)*		
Congressional Add: *High Energy Laser Development*	-	5.000
Congressional Add: *Missile Rapid Demonstration Capability*	-	10.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603464A *I Long Range Precision Fires Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Congressional Add Subtotals for Project: BO8	-	15.000
Congressional Add Totals for all Projects	-	15.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) AE6 / *Strategic Long Range Cannon Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AE6: *Strategic Long Range Cannon Advanced Technology*	-	0.000	77.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	77.000

Note

In Fiscal Year 2020 (FY20) this Project was realigned from:
PE 0603004A Weapons and Munitions Advanced Technology
* Project 232 Advanced Lethality & Survivability Demo

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by maturing and demonstrating technologies for a long range cannon capability to deliver lethal effects at strategic ranges while providing lethality overmatch.

Work in this Project complements PE 0604115A Technology Maturation Initiatives / Project AY6 Strategic Long Range Cannon.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

Project AE6 is being eliminated in FY 2021.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Strategic Long Range Cannon Advanced Technology	-	73.503	-
Description: This effort will mature and demonstrate subsystem technologies to further enhance range, lethality, and precision enablers for extended range cannon and munition systems.			
FY 2020 Plans: Will mature and optimize long range armament technologies for both weapons and munitions to support potential deep strike objective capabilities from future cannon artillery systems; will enhance component level technologies for novel cannon, munition, and fire control, including guidance and propulsion systems, for artillery fired projectiles. Will provide revolutionary performance for Long Range Fires by developing enhanced lethality and range extension technologies for integrated system level performance with maximum effects from cannons.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AE6 / *Strategic Long Range Cannon Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Advanced Technology Development (6.3) portion of SLRC effort completes in FY 2020.			
Title: FY 2020 SBIR/STTR Transfer	-	3.497	-
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	-	77.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) AE8 / *Land-Based Anti-Ship Missile (LBASM) Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AE8: *Land-Based Anti-Ship Missile (LBASM) Advanced Tech*	-	0.000	6.761	10.057	-	10.057	15.892	26.269	18.350	0.000	0.000	77.329

Note

In Fiscal Year (FY) 2020 this Project was realigned from:
Program Element (PE) 0603313A Missile and Rocket Advanced Technology, Project:
* 263 Future Msl Tech Integr

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by maturing and demonstrating critical technologies to detect, engage, and defeat moving land or maritime surface targets under all conditions.

Work in this Project complements PE 0602147A Long Range Precision Fires Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Land Based Anti-Ship Missile (LBASM) Advanced Technology	-	6.453	10.057
Description: Matures and demonstrates technologies that enable high-mobility artillery rocket system (HIMARS) and multiple-launch rocket system (MLRS) rocket/missile artillery systems to destroy enemy air defenses in the land and the maritime domains.			
FY 2020 Plans: Will continue component integration/demonstration of multi-mode seeker that provides target classification/discrimination and aim-point selection on critical target features and lethal payload that provides maximum effects against multi-domain target sets. Will also continue to validate components and optimize concepts for system integration.			
FY 2021 Plans: Will mature and demonstrate multi-mode seeker technologies in a surrogate missile system to obtain real world effect on seeker performance; analyze and exploit the data obtained through flight testing to optimize tracking, identification and aim-point			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AE8 / *Land-Based Anti-Ship Missile (LBASM) Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
algorithms; conduct system level performance testing through hardware-in-the-loop and system captive carry to improve the performance and precision of the sensor suite. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increase due to FY 2021 integration and evaluation of seeker technologies through hardware-in-the-loop and flight testing.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.308	-
Accomplishments/Planned Programs Subtotals	-	6.761	10.057

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army											Date: February 2020	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*				Project (Number/Name) AE9 / *Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
AE9: *Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech*	-	0.000	14.149	10.077	-	10.077	0.000	0.000	0.000	0.000	0.000	24.226

Note

In Fiscal Year (FY) 2020 this Project was realigned from:
Program Element (PE) 0603313A Missile and Rocket Advanced Technology:
* Project 263 Future Msl Tech Integr

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires (LRPF) Modernization Priority capabilities by maturing and demonstrating propulsion technologies that enables extended range target engagements and navigation component technologies that reduce dependence on Global Positioning System (GPS) for precision effects. Additionally, technology development will support LRPF capabilities by investigating and developing critical technologies for the delivery of dedicated organic intelligence, surveillance and reconnaissance (ISR) payloads and attack capabilities via long range missiles. These long range missile delivered payloads will provide ISR that will be able to provide targetable data for area and point targets, and attack platforms for targets of opportunity.

Work in this Project complements PE 0602147A Long Range Precision Fires Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Low-Cost Tactical Extended Range Missile (LC-TERM) Advanced Technology	-	13.507	10.077
Description: Mature and demonstrate propulsion technologies that enables extended range target engagement and navigation component technologies that reduce dependence on GPS for precision.			
FY 2020 Plans: Will integrate enhanced long-range fires navigation components and demonstrate performance in high fidelity hardware-in-the-loop simulation environment validating improved precision guidance in GPS degrade environments. Will also integrate high temperature fiber, resin, nozzle, and structures propulsion component technologies and demonstrate performance through static solid rocket motor firing validating improved energy output in the same form factor.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AE9 / *Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Will complete demonstrations of integrated enhanced long range fires navigation technologies to verify reduced dependence on GPS for precision effects, which include improved inertial, anti-jam, and complementary navigation technologies; will demonstrate with static motor testing high temperature fiber, resin, optimized case insulation, nozzle, and structures propulsion component technologies to verify increased mass fraction, energy output, and range in the same form factor. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decrease due to completion of final demonstration.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.642	-
Accomplishments/Planned Programs Subtotals	-	14.149	10.077

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) AF4 / *Missile Simulation Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AF4: *Missile Simulation Advanced Technology*	-	0.000	0.273	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.273

Note

In Fiscal Year 2020 (FY20) this Project was realigned from:
Program Element (PE) 0603313A Missile and Rocket Advanced Technology
* Project 206 Missile Simulation

In Fiscal Year 2021 (FY21) this Project was realigned to:
PE 0602147A Long Range Precision Fires Technology
* Project AF8 Affordable Extended Range Precision Technology

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by maturing and demonstrating enhanced analysis and high fidelity modeling and simulation technologies for advanced missiles and interceptor design and analysis.

Work in this Project complements PE 0602147A Long Range Precision Fires Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Missile Simulation Advanced Technology	-	0.260	-
Description: Mature and demonstrate enhanced analysis and high fidelity modeling and simulation technologies for advanced missiles and interceptor design and analysis.			
FY 2020 Plans: Will mature the development of very high speed missile simulation architectures for rapid performance predictions; inform technology requirements; and reduce technology development timelines.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AF4 / *Missile Simulation Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Beginning in Fiscal Year 2021, efforts for this project are realigned to PE 0602147A Long Range Precision Fires Technology / Project AF8 Affordable Extended Range Precision Technology.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.013	-
Accomplishments/Planned Programs Subtotals	-	0.273	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) AG3 / *Extended Range Cannon Artillery (ERCA) Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AG3: *Extended Range Cannon Artillery (ERCA) Adv Tech*	-	0.000	19.992	18.419	-	18.419	3.237	3.362	2.997	5.078	0.000	53.085

Note

In Fiscal Year (FY) 2020 this Project was realigned from:
Program Element (PE) 0603004A Weapons and Munitions Advanced Technology, Project:
* 232 Advanced Lethality & Survivability Demo

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities. This effort matures and demonstrates artillery technologies including light weight cannon and mount structures, high efficiency recoil cylinders, common lower power fire control hardware, improved fire control software, and improved sensor to shooter communications which will increase range and accuracy without an increase in platform weight. This effort also develops a collaborative environment with analytic capabilities to support Fires and Intel Soldiers.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Extended Range Cannon Artillery Advanced Technology	-	19.084	15.309
Description: This effort matures and demonstrates extended range Armament technologies including Cannons and Gun Mounts, novel integration for automation, improved fire control, ammunition handling, and improved sensor to shooter communications which will maximize range increases and enable increase precision with next generation munition and target acquisition technology.			
FY 2020 Plans: Will continue maturation of integration and automation technologies for ammunition handling and weapon control, initial prototype and demonstration of advanced precision technologies from fire control sensors and systems; Will optimize cannon, mount, and weapon system components to maximize weight reduction and automation adaptability			
FY 2021 Plans: Will continue maturation of integrated automation technologies for the ammunition handling and weapon control components; will optimize cannon, mount, and weapon system components to maximize weight reduction, optimize cannon/projectile interfaces,			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AG3 / *Extended Range Cannon Artillery (ERCA) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
as well as ancillary components for automation; will demonstrate automated ammunition handling at high rates of fire; will demonstrate initial prototype of advanced precision technologies integrated in artillery fire control sensors and systems. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 Funding decreased due to the prototype of precision technologies completing in FY 2020.			
Title: Synchronized High Op-Tempo (SHOT) Targeting for LRPF ***Description:*** This effort develops a collaborative environment with analytic capabilities to support Fires and Intel Soldiers in organizing planning products, and analytics that automate data discovery and development of targets and streamlining workflows that support Course of Action development. ***FY 2021 Plans:*** Will mature and demonstrate initial multiple intelligence (multi-INT) algorithms capable of facilitating timely creation of intelligence to support long range fires missions. Will demonstrate system platforms capable of managing cross-domain, multi-INT, multi-platform data flows, and evaluate on the basis of speed, accuracy, and data integrity. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding realigned from PE 0603463A Network C3I Advanced Technology, Project AN8 COE - Every Receiver is a Sensor Advanced Tech.	-	-	3.110
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.908	-
Accomplishments/Planned Programs Subtotals	-	19.992	18.419

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) AG5 / *Extended Range Artillery Munition Suite Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AG5: *Extended Range Artillery Munition Suite Adv Tech*	-	0.000	35.600	50.227	-	50.227	41.207	30.622	30.886	27.891	0.000	216.433

Note

In Fiscal Year (FY) 2020 this Project was realigned from:
Program Element (PE) 0603004A Weapons and Munitions Advanced Technology:
* Project 232 Advanced Lethality & Survivability Demo

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities. This effort matures and demonstrates extended range artillery technologies including advanced projectile propulsion and guidance technologies to increase range and accuracy.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Extended Range Artillery Munition Suite Advanced Technology	-	33.984	50.227
Description: Matures and optimizes long range unitary artillery projectile systems in the areas of range, precision, counter-measure, and payload technologies.			
FY 2020 Plans: Effort will validate system modeling and simulation to improve projectile performance by integrating the optimal configurations of technologies; will develop and demonstrate integrated concepts for Extended Range Artillery Projectiles (e.g. XM1155) in the areas of increased range, sensor optimization and integration, improved algorithms and refined concepts at extended ranges in Integrated Air Defense Systems (IADS) contested and GPS-denied environments for armor and counter-battery defeat; will optimize system development for extended range cargo munitions for advanced area effects munition compatible with legacy and ERCA in the following areas: 1) dispensing techniques and sensor optimization for improved area effects to service imprecisely located targets ; 2) optimal formulations and characteristics for smoke and illumination payloads that maximize effectiveness ; and 3) survivability of cannon-launched terrain shaping munition for maximum area denial effects; will conduct critical design review			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AG5 / *Extended Range Artillery Munition Suite Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
of component technologies; will perform demonstration to validate key enabling component technologies; optimize concepts for system integration; and will mature modeling and simulation concepts for subsequent validation. ***FY 2021 Plans:*** Will mature long range unitary artillery projectile systems to validate system modeling and simulation to optimize configurations of projectile technologies for increased performance; will demonstrate integrated concepts of Extended Range Artillery Projectiles (e.g. XM1155) including improved algorithms, increased range, sensor optimization and integration; will further optimize extended range cargo munitions for advanced area effects munition compatible with current and future artillery systems in the following areas: 1) dispensing techniques and sensor optimization for improved area effects; 2) formulations and characteristics for smoke and illumination payloads; and 3) survivability of cannon-launched terrain shaping munition. Will perform demonstration to validate key enabling component technologies. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increase is due to FY 2021 demonstrations of integrated matured components and munition dispensing technologies.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	1.616	-
Accomplishments/Planned Programs Subtotals	-	35.600	50.227

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) AG7 / *Energetic Materials and Adv Processing Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AG7: *Energetic Materials and Adv Processing Adv Tech*	-	0.000	2.040	2.079	-	2.079	2.121	2.163	0.000	0.000	0.000	8.403

Note

In Fiscal Year (FY) 2020 this Project was realigned from:
Program Element (PE) 0603004A Weapons and Munitions Advanced Technology:
* Project 232 Advanced Lethality & Survivability Demo

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities. This effort matures and demonstrates the performance of energetic materials ranging from medium caliber through large caliber weapons.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Scale-up of Insensitive Energetic Materials	-	1.948	2.079
Description: This effort matures and demonstrates the performance and insensitivity of energetic materials ranging from 25mm medium caliber (direct fire) through 155mm large caliber (indirect fire) weapons. ***FY 2020 Plans:*** Will continue to qualify energetic materials for complete material characterization; demonstrate high-energy, reduced sensitivity, metalized formulations for dual purpose representative munitions; will demonstrate high-energy, reduced sensitivity formulations for shaped charge representative munitions; will demonstrate high energy propellant in representative applications; will continue to optimize and demonstrate advanced processing methods of novel materials. ***FY 2021 Plans:*** Will continue to demonstrate and qualify energetic materials for complete material characterization; will demonstrate developed high-energy explosive and propellant formulations in representative applications; will mature and optimize advanced processing methods for increased scale and higher throughput of energetic ingredients and formulations. ***FY 2020 to FY 2021 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AG7 / *Energetic Materials and Adv Processing Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Nominal planned project increase			
Title: FY 2020 SBIR/STTR Transfer	-	0.092	-
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	-	2.040	2.079

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) AH3 / *Single Multi-mission Attack Missile Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AH3: *Single Multi-mission Attack Missile Adv Tech*	-	0.000	5.683	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.683

Note

In Fiscal Year 2020 (FY20) this Project was realigned from:
Program Element (PE) 0603313A Missile and Rocket Advanced Technology
* Project 263 Future Msl Tech Integr

In Fiscal Year 2021 (FY21) this Project is realigned to
PE 0603465A Future Vertical Lift Advanced Technology
* Project AK5 Multi-Role Small Guided Missile Advanced Tech

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities. Matures and demonstrate technologies for an expeditionary short-to-medium range loitering missile with man-in-the-loop capability for situational awareness, targeting, and lethal effects against hard and soft targets.

Work in this Project complements PE 0602147A Long Range Precision Fires Technology and PE 0603465A Future Vertical Lift Advanced Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Single Multi-mission Attack Missile (SMAM) Advanced Technology	-	5.424	-
Description: Matures and demonstrate technologies for an expeditionary short-to- medium range loitering missile with man-in-the-loop capability for situational awareness, targeting, and lethal effects against hard and soft targets.			
FY 2020 Plans: Will integrate certified mini-crypto module in an extended range missile digital datalink for secure missions. Develop and integrate inertial navigation aiding sensors and algorithms to provide suitable target accuracy for terminal engagement in GPS degraded/ denied environments. Perform static testing of multi-effects warhead technologies optimized to defeat future mechanized threats.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** AH3 / *Single Multi-mission Attack Missile Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Beginning in FY 2021, efforts for this project were realigned to PE 0603465A / Future Vertical Lift Advanced Technology, AK5 / Multi-Role Small Guided Missile Advanced Tech.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.259	-
Accomplishments/Planned Programs Subtotals	-	5.683	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) BO8 / *Long Range Precision Fires Advanced Tech (CA)*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
BO8: *Long Range Precision Fires Advanced Tech (CA)*	-	0.000	15.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.000

Note

Congressional Interest Item funding provided for Long Range Precision Advanced Technology.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding provided for Long Range Precision Advanced Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
Congressional Add: High Energy Laser Development	-	5.000
FY 2020 Plans: High Energy Laser Development		
Congressional Add: Missile Rapid Demonstration Capability	-	10.000
FY 2020 Plans: Missile Rapid Demonstration Capability		
Congressional Adds Subtotals	-	15.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) BS3 / *Strategic Missile Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
BS3: *Strategic Missile Advanced Technology*	-	0.000	12.888	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.888

Note

In Fiscal Year 2020 (FY20) this Project was realigned from:
Program Element (PE) 0603313A Missile and Rocket Advanced Technology
* Project 263 Future Msl Tech Integr (FMTI)
* Project 704 Advanced Missile Demo
PE 0603004A Weapons and Munitions Advanced Technology
* Project 232 Advanced Lethality & Survivability Demo

In Fiscal Year 2021 (FY21) this Project is realigned to:
PE 0603464A Long Range Precision Fires Advanced Technology
* Project BY2 Advanced Hypersonic Technology

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by developing and maturing critical technologies for ground-based strategic missiles. Technology development includes critical technologies to improve strategic missile components such as advanced structures and materials, thermal protection systems, guidance/seekers, navigation systems, electronic controls, improve/miniaturize avionics and automated fight termination systems.

Work in this Project complements PE 0602147 Long Range Precision Fires Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the U.S. Army Futures Command (AFC) in coordination with the United States Army Rapid Capability and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Strategic Missile Advanced Technology	-	12.303	-
Description: This effort develops and matures critical technologies for ground-based strategic missiles.			
FY 2020 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** BS3 / *Strategic Missile Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Will continue to develop and mature critical technologies to improve strategic missile components such as advanced structures and materials, thermal protection systems, guidance/seekers, navigation systems, electronic controls, improve/miniaturize avionics and automated flight termination systems. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** In FY 2021, this Project is realigned to: PE 0603464A Long Range Precision Fires Advanced Technology: * Project BY2 Advanced Hypersonic Technology			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.585	-
Accomplishments/Planned Programs Subtotals	-	12.888	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / *Long Range Precision Fires Advanced Technology*	Project (Number/Name) BY2 / *Advanced Hypersonic Technology*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
BY2: *Advanced Hypersonic Technology*	-	0.000	0.000	30.201	-	30.201	24.077	21.782	49.055	49.058	0.000	174.173

Note

In FY 2021 (FY21) this Project is realigned from:
PE 0603464A Long Range Precision Fires Advanced Technology:
* Project BS3 Strategic Missile Advanced Technology

A. Mission Description and Budget Item Justification

This Project matures and develops subsystem and components technologies loading, thermal, environmental, vibration, transportation and erecting of a hypersonic weapon delivery system. The project also develops canister subsystem and components models to assess thermal, environmental, form, fit and function for vibration isolation and fit on a prototype hypersonic weapon system under a separate effort. The modeling effort, design and engineering efforts will be documented in a Technical Data Package (TDP) for a canister. The technologies will be assessed as part of a flight test for subsystem and component operability of a future hypersonic weapon.

The cited work is consistent with the Under Secretary of the Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Futures Command (AFC) in coordination with the United States Army Rapid Capability and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Hypersonics Advanced Technology	-	-	30.201
Description: This Project matures and demonstrates new subsystems and components of a hypersonic weapon delivery system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other high payoff/ time critical targets. The effort includes modeling and simulating interfaces, data formats and networks to simulate integration into existing Army command and control systems for a separate, future prototype hypersonic weapon system effort.			
FY 2021 Plans: Will begin modeling, simulation and demonstrating of system components of Long Range Hypersonic Weapon. Will begin simulation of integration of subsystems and component technologies to optimize hypersonic weapon system performance.			
FY 2020 to FY 2021 Increase/Decrease Statement: In FY 2021, this Project is realigned from: PE 0603464A Long Range Precision Fires Advanced Technology:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603464A / *Long Range Precision Fires Advanced Technology*	**Project (Number/Name)** BY2 / *Advanced Hypersonic Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
* Project BS3 Strategic Missile Advanced Technology			
Accomplishments/Planned Programs Subtotals	-	-	30.201

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A