Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602307A *I Advanced Weapons Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	-	36.959	44.468	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	81.427
042: *High Energy Laser Technology*	-	21.959	29.468	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	51.427
NA5: *Advanced Weapons Components (CA)*	-	15.000	15.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.000

Note

In Fiscal Year (FY) 2020, this Program Element (PE) is realigned with continuity of effort to the following PE:
* 0602150A Air and Missile Defense Technology

A. Mission Description and Budget Item Justification

This PE investigates enabling technologies for High Energy Laser (HEL) weapons. Project 042 develops component technologies such as efficient, high energy, solid state lasers; advanced beam control components; and lethality / effectiveness measurements that enable better models and simulations for future HEL weapon designs.

Work in this PE is related to, and fully complements, efforts in PE 0601101A (In-House Laboratory Independent Research), PE 0602120A (Sensors and Electronic Survivability), PE 0603004A (Weapons and Munitions Advanced Technology) and Air Force PE 0602890F (HEL Research).

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

Work is performed by the United States Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC / ARSTRAT) in Huntsville, AL, and the High Energy Laser Systems Test Facility at White Sands Missile Range, NM.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602307A *I Advanced Weapons Technology*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	22.785	29.502	24.457	-	24.457
Current President's Budget	36.959	44.468	0.000	-	0.000
Total Adjustments	14.174	14.966	-24.457	-	-24.457
• Congressional General Reductions	-0.017	-0.034			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	15.000	15.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.809	-			
• Adjustments to Budget Years	-	-	-24.457	-	-24.457

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: NA5: *Advanced Weapons Components (CA)*		
Congressional Add: *High Energy Laser Development for ATVs*	10.000	-
Congressional Add: *Army Aerophysics Research*	5.000	-
Congressional Add: *High energy laser technology*	-	10.000
Congressional Add: *COE in high energy and laser and optical technology*	-	5.000
Congressional Add Subtotals for Project: NA5	15.000	15.000
Congressional Add Totals for all Projects	15.000	15.000

Change Summary Explanation

FY18 Congressional add of $15 Million
FY19 Congressional add of $15 Million
FY20 PE eliminated due to Science & Technology Financial Restructuring.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602307A / *Advanced Weapons Technology*	Project (Number/Name) 042 / *High Energy Laser Technology*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
042: *High Energy Laser Technology*	-	21.959	29.468	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	51.427

Note

In Fiscal Year (FY) 2020 this Project is realigned to:
Program Element (PE) 0602150A Air and Missile Defense Technology
* Project AC9 High Energy Laser Tactical Vehicle Demonstrator Technology
* Project AD2 High Energy Laser (HEL) Enabling and Support Technology
* Project AD9 Close Combat High Energy Laser Technology

A. Mission Description and Budget Item Justification

This Project investigates and develops advanced technologies for High Energy Laser (HEL) weapon systems to enable more efficient laser systems with greater power output. This includes technologies to support development of alternate laser sources, precision optical pointing and tracking components, adaptive optics to overcome laser degradation due to atmospheric effects, and thermal management systems to remove excess heat. In addition, this effort validates laser lethality performance and conducts analyses against a variety of targets and investigates the impact of low-cost laser countermeasures. This project includes laboratory efforts for HEL applied research as well as concepts analysis for United States Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) Technical Center competencies in directed energy, missile defense, and space technical areas. Solid State Laser (SSL) efforts continue to leverage other funds provided by the HEL Joint Technology Office (JTO), the Air Force, and the Navy to develop multiple technical approaches that reduce program risk and maintain competition.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Solid State Laser Effects	3.538	4.051	-
Description: This effort provides the underlying data required to support high energy laser weapon system effectiveness analyses. This activity includes the full spectrum of lethality testing from fundamental physics investigations to the engagement of flying targets in relevant scenarios. This activity is primarily executed at the Solid State Laser Testbed (SSLT) facility at White Sands Missile Range, New Mexico.			
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602307A / *Advanced Weapons Technology*	**Project (Number/Name)** 042 / *High Energy Laser Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Will complete vulnerability modules and lethality database inputs for UAS Groups 1, 2, and 3. Will continue development of lethality database input for rocket, artillery, and mortar (RAM) threats supporting HEL Tactical Vehicle Demonstrator (TVD). Will begin investigating lethal/aimpoint on manned fixed- and rotary-wing aircraft. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** This research effort will realign to PE 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Te), Project AD2 (High Energy Laser (HEL) Enabling and Support Techn), and Project AD9 (Close Combat High Energy Laser Technology) in FY20 as part of the financial restructuring.			
Title: Advanced Beam Control Component Development ***Description:*** This effort investigates technologies to enable lighter, more agile beam control systems that are robust enough to be used in Army platforms. This work is done in collaboration with the High Energy Laser (HEL) Joint Technology Office (JTO) and other Services. ***FY 2019 Plans:*** Will complete Critical Design Review (CDR) for the BCS for the High Energy Laser Tactical Vehicle Demonstrator (HEL TVD). Will validate performance of a state-of-the-art adaptive optics (AO) subsystem on a test range using the Mobile Beam Control System Integration Laboratory (MBC SIL), a key knowledge point for HEL TVD development. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** This research effort will realign to PE 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Te), Project AD2 (High Energy Laser (HEL) Enabling and Support Techn), and Project AD9 (Close Combat High Energy Laser Technology) in FY20 as part of the financial restructuring.	7.084	17.419	-
Title: High Efficiency Laser Development ***Description:*** This effort develops component technologies that increase Solid State Laser (SSL) efficiencies, which will lead to reductions in size and weight for multiple subsystems that greatly improve the ability to integrate SSL systems into Army weapon platforms. This work is done in collaboration with the High Energy Laser (HEL) Joint Technology Office (JTO) and other Services. Selected laser design will be fabricated and integrated onto an Army platform to demonstrate a high energy laser system functionality and is fully coordinated with PE 0603004A, Project L96. ***FY 2019 Plans:*** Will complete 100kW laser subsystem build in support of the High Energy Laser Tactical Vehicle Demonstrator (HEL TVD) effort. ***FY 2019 to FY 2020 Increase/Decrease Statement:***	9.916	5.951	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602307A / *Advanced Weapons Technology*	**Project (Number/Name)** 042 / *High Energy Laser Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
This research effort will realign to PE 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Te), Project AD2 (High Energy Laser (HEL) Enabling and Support Techn), and Project AD9 (Close Combat High Energy Laser Technology) in FY20 as part of the financial restructuring.			
Title: HEL Research and Development and Concepts Analysis Laboratories ***Description:*** This effort focuses on developing in-house expertise through Solid State Laser (SSL) assessments and starting in Fiscal Year (FY) 2015, other USASMDC/ARSTRAT technical core competencies, including air and missile defense, responsive space, and small satellites. ***FY 2019 Plans:*** Will complete analysis of laboratory level experiments to validate ETS performance against baseline requirements. Will complete collecting field data to support model verification. Will develop initial algorithms for advance adaptive optics. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** This research effort will realign to PE 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Te), Project AD2 (High Energy Laser (HEL) Enabling and Support Techn), and Project AD9 (Close Combat High Energy Laser Technology) in FY20 as part of the financial restructuring.	1.421	1.033	-
Title: FY 2019 SBIR / STTR Transfer ***Description:*** FY 2019 SBIR / STTR Transfer ***FY 2019 Plans:*** FY 2019 SBIR / STTR Transfer ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 SBIR / STTR Transfer	-	1.014	-
Accomplishments/Planned Programs Subtotals	21.959	29.468	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602307A / *Advanced Weapons Technology*	**Project (Number/Name)** 042 / *High Energy Laser Technology*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army												Date: March 2019
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602307A / *Advanced Weapons Technology*				Project (Number/Name) NA5 / *Advanced Weapons Components (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
NA5: *Advanced Weapons Components (CA)*	-	15.000	15.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.000

Note

Congressional increase for Program increase

A. Mission Description and Budget Item Justification

Congressional Interest Item funding provided for Advanced Weapons Components applied research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: High Energy Laser Development for ATVs	10.000	-
FY 2018 Accomplishments: High Energy Laser Development for ATVs		
Congressional Add: Army Aerophysics Research	5.000	-
FY 2018 Accomplishments: Army Aerophysics Research		
Congressional Add: High energy laser technology	-	10.000
FY 2019 Plans: High energy laser technology		
Congressional Add: COE in high energy and laser and optical technology	-	5.000
FY 2019 Plans: COE in high energy and laser and optical technology		
Congressional Adds Subtotals	15.000	15.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A