Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	266.197	213.728	211.523	-	211.523	-	-	-	-	-	-
280: *RECOV VEH IMPROV PROG*	-	64.006	121.811	108.954	-	108.954	-	-	-	-	-	-
330: *Abrams Tank Improve Prog*	-	114.723	61.039	50.331	-	50.331	-	-	-	-	-	-
371: *Bradley Improve Prog*	-	45.813	8.773	21.271	-	21.271	-	-	-	-	-	-
EE2: *Stryker Improvement*	-	41.655	22.105	30.967	-	30.967	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Program Element (PE) 0203735A Combat Vehicle Improvement Programs corrects vehicle deficiencies identified during Army operations; continues technical system upgrades to include the integration of applicable technologies on ground systems; addresses needed evolutionary enhancements to tracked combat vehicles; and develops technology improvements which have application to or insertion opportunities across multiple Ground Combat Systems vehicles. This PE provides combat effectiveness and Operating and Support (O&S) cost reduction enhancements for the Abrams tanks, Bradley Fighting Vehicles and Stryker Family of Vehicles (FOVs) through a series of product improvements.

The strategy for Abrams and Bradley will focus on incrementally delivering capability to the warfighter to meet both near-term limitations as well as mitigating gaps and maintaining combat overmatch in the future. This effort was approved by the Army Acquisition Executive in 3rd Quarter (QTR) Fiscal Year (FY) 2011.

The Recovery Vehicle Improvement program is an Engineering Change Proposal (ECP) that will allow the current recovery vehicle to regain Single Vehicle Recovery (SVR) for the heaviest tracked combat vehicle as defined in the Heavy Equipment Recovery Combat Utility Lift and Evacuation System (HERCULES) Enhanced M88A2E1 Capability Production Document Increment 2 dated 20 January 2017. The fielded M88A2 HERCULES lacks the necessary power, weight, and braking ability to safely support the recovery of the M1A2SEPv2 in all situations and with the next generation M1A2SEPv3 weight growth, the problem will get worse. The M88A3 vehicles will bring back the operational capability of the single vehicle recovery. The increased winching and lifting capability accommodates all 80 ton Abrams variants. Without this increased capability, units must use two M88A2 Medium Recovery Vehicles to perform the necessary spectrum of recovery operations.

The Abrams M1A2 SEP V2 and M2/M3A3 Bradley Fighting Vehicles are at or exceed Space, Weight, and Power-Cooling (SWaP-C) limitations. In order to host and restore lost platform capability, the Abrams Tank and Bradley Fighting Vehicle programs will execute a series of ECPs to support the current embedded systems and to facilitate integration of technologies currently in development under other existing Programs of Record. The ECPs are not intended to exceed the operational capability outlined in current system requirements documents, but rather to ensure that the existing system performance is not further degraded and that Army mission equipment packages can be integrated on the Abrams and Bradley Platforms.

Stryker Improvement will address the development of Lethality, Survivability, Mobility, Network Lethality, and Communication, Command and Control (C3) improvements within the Stryker Family of Vehicles (FoV). Principal development efforts include upgrades associated with the Stryker Double V-Hull A1 (DVH A1) Engineering Change

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0203735A *I Combat Vehicle Improvement Programs*

Proposal (ECP), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS), Common Remotely Operated Weapon Station-Javelin (CROWS-J) ONS, Stryker Survivability Enhancement, and Stryker Lethality ECPs. DVH A1 ECP upgrades restore Stryker DVH Space, Weight, and Power-Cooling (SWaP-C) lost as a result of incorporating vehicle changes to counter threats encountered during deployment operations while allowing the future network to be hosted without further degradation in vehicle protection and mobility. The Stryker 30mm ICVD and CROWS-J ONS efforts addressed Urgent Operational Need to increase the lethality of Stryker Infantry Carrier Vehicles (ICV) within the United States Army European Command (USAREUR). The 30mm ICVD ONS effort integrates a 30mm-equipped weapon station providing, USAREUR with precision direct firepower to overwhelm the enemy in encounter actions and suppressive fire to preserve mounted and dismounted freedom of movement. The Stryker Survivability Enhancements address evolving threats by assessing survivability improvements, to include but not limited to, passive protection systems, active protection systems, an under-armor fire capability for Stryker-equipped reconnaissance troops, 360 Situational Awareness, reactive armor tiles, and integration of emerging and existing technologies such as the Fire Direction Center, Integrated Visual Augmentation System (IVAS), and other Stryker based platform solutions. The Stryker Fire Direction Center (FDC) will provide an on-the move capability that processes voice and digital data while maintaining contact with the indirect fire team over extended distances. Stryker Lethality ECP efforts (30mm Medium Caliber Weapon System (MCWS), CROWS-J, Anti-Tank Guided Missile (ATGM), and other capabilities) focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs). Additionally, the Lethality MEP upgrades will address existing obsolescence issues of the Remote Weapon Station (RWS) with the CROWS and CROWS-J upgrade. The ATGM ECP will upgrade the Modified Improved Target Acquisitions System (MITAS), incorporating a far target locator and enabling the dissemination of target acquirement information utilizing networked lethality, providing a common operating picture. Upgrades of the Stryker flat-bottom hull and DVH variants were completed to mitigate known system deficiencies.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	277.633	268.919	218.391	-	218.391
Current President's Budget	266.197	213.728	211.523	-	211.523
Total Adjustments	-11.436	-55.191	-6.868	-	-6.868
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-45.376			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.014	-			
• SBIR/STTR Transfer	-11.422	-9.815			
• Adjustments to Budget Years	-	-	-6.868	-	-6.868

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 280 / *RECOV VEH IMPROV PROG*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
280: *RECOV VEH IMPROV PROG*	-	64.006	121.811	108.954	-	108.954	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The M88A2 Heavy Equipment Recovery Combat Utility Lift and Evacuation System (HERCULES), designated as an Acquisition Category (ACAT IC) program on 15 Jun 2016, has been providing towing, winching, and hoisting operations to support battlefield recovery operations and evacuation of heavy tanks and other tracked combat vehicles since its production and deployment in 1998. The M88A2 HERCULES recovers tanks mired to different depths, removes M1 Abrams turrets and power packs, and uprights overturned heavy combat vehicles. Currently, the M88A2 is unable to safely perform Single Vehicle Recovery (SVR) of the Abrams tank in all conditions, due to added weight/survivability improvements made to the tank. In order to ensure single vehicle recovery is met, Project Director- Main Battle Tank Systems (PD-MBTS) will develop and integrate Engineering Change Proposal (ECP) technologies for the M88A2 HERCULES through an initiative to meet its operational requirements of single vehicle recovery throughout its life cycle. This initiative is not intended to exceed current operational capability, but will instead regain single vehicle recovery capability of the heaviest tracked combat vehicle.

Analyses conducted to date suggests that upgrades to the M88A2 track, suspension, hydraulics, engine, transmission and other related components are required to meet single vehicle recovery for the heaviest tracked combat vehicle.

Fiscal Year (FY) 2022 Base dollars will fund preparations for USG prototype testing and continue the Program Management Office support; to include labor, training, travel, supplies, and equipment to effectively manage the program. Finalizing Prototype assembly in FY 2022 and execute initial contractor testing.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Program Management Office (PMO) Support	1.752	1.926	2.344
Description: PMO support includes Systems Engineering, Logistics, Government and in-house support Contractor salaries, travel and other support costs required to effectively manage the program. ***FY 2021 Plans:*** The program continues OTA project oversight, supports technical solution development for continued M88A3 prototype builds and continued preparation of follow-on Other Transactional Award (OTA) production contract(s). Continue Government Systems Engineering and Program Management office support in FY 2021. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2022 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
The program continues OTA project oversight, supports technical solution development for continued M88A3 prototype builds, support for system-level verification and test, and preparation of production contract(s). Continue Government Systems Engineering, Logistics, test support at multiple sites and Program Management office support in FY 2022. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in PMO support is accounted for by the increased support required for assisting contractor's increased workload and the start of prototype testing.			
Title: Product Development ***Description:*** Design and Development of ECPs. ***FY 2021 Plans:*** The program continues development of M88A3 prototype builds, component qualification testing, and finalizing design and integration activities though FY 2022. ***FY 2022 Plans:*** The program completes development of the M88A3 prototype builds, contractor component qualification and systems shakedown testing to support (8) M88A3 prototype vehicle Government Acceptance. Program starts Government System Level test and verification in FY 2023. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The decrease in the FY 2022 funding is due to the completion of (8) M88A3 prototype builds, completion of the OEM prove-out, and delivery of the vehicles to the government. The predominance of the FY 2021 efforts included M88A3 prototype material deliveries and engineering design activities. The overall program activities in FY 2022 involve finishing the ECP design, the delivery of the (8) M88A3 prototype vehicles to the government, and preparing for extensive government DT&E of the M88A3 at multiple test site locations.	62.244	119.388	101.201
Title: Test and Evaluation ***Description:*** The Army is conducting Developmental Test and Evaluation (DT&E) on (8) prototype M88A3 vehicles to confirm Single Vehicle Recovery capability for an 80T Main Battle Tank. Test data supports an evaluation of the M88A3 for use in a production decision in FY 2023. DT&E for the M88A3 includes safety testing, automotive performance, recovery, transportability, Reliability Availability and Maintainability (RAM), Electromagnetic Interference (EMI), Cybersecurity, Survivability-Live Fire Test & Evaluation (LFT&E), environmental effects, logistics demonstration, and Operational Testing. ***FY 2021 Plans:***	0.010	0.497	5.409

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Testing for FY 2021 Aberdeen Proving Grounds site improvements to support full vehicle level testing and test planning starting in FY 2022. ***FY 2022 Plans:*** The Contractor and USG Test Readiness Reviews, as well as all associated M88A3 test planning and preparations, will occur in FY 2022. Vehicle inspection and characterization, instrumentation, and operator training will commence upon arrival of prototype vehicles at both Aberdeen Test Center (ATC) and Yuma Proving Grounds (YPG), followed by the startup of Automotive Performance and RAM testing. Modeling and Simulation (M&S) in support of LFT&E will begin upon receipt of technical data at Test Readiness Review (TRR). Technical manual validation will also start in FY 2022. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The Test and Evaluation funding increase in FY 2022 is due to the conduct of Test Readiness Reviews, test planning, and preparation of vehicles for start of M88A3 Developmental Test and Evaluation.			
Accomplishments/Planned Programs Subtotals	64.006	121.811	108.954

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GA0570: *Improved Recovery Vehicle (M88A2 HERCULES)*	80.146	-	52.059	-	52.059	-	-	-	-	-	-
• G80571: *M88 FOV MODS*	4.500	18.382	-	-	-	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The Project Director (PD) for Main Battle Tank Systems (MBTS) is executing an Engineering Change Proposal (ECP) to regain single vehicle recovery capability of the M88A2 HERCULES vehicle. The strategy utilizes the Detroit Arsenal Automotive Other Transaction Authority (DA2 OTA) which competitively awarded a single contract to develop, integrate and produce up to (8) prototype vehicles entering testing in FY 2022. After achieving OTA success criteria, a contract award using procurement dollars procures up to (70) initial production vehicles, as well as the procurement of hardware kits/components comprised of engines, transmissions, track and suspensions. Federal Acquisition Regulation (FAR) based contract for follow on M88A3 production contract through the defined Army Acquisition Objective (AAO). The M88A2 HERCULES production vehicles continue fielding to Units through FY 2023.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 280 / *RECOV VEH IMPROV PROG*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	Various	BAE Systems : TBD	33.527	62.244	Nov 2019	119.388	Oct 2020	101.201	Oct 2021	-		101.201	0.000	316.360	-
		Subtotal	33.527	62.244		119.388		101.201		-		101.201	0.000	316.360	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Office (PMO) Support	MIPR	PMO Support Offices, Ricardo Defense, DCS and Army Research Labs (ARL) : Various	3.623	1.752	Jan 2020	1.926	Jan 2021	2.344	Dec 2021	-		2.344	0.000	9.645	-
		Subtotal	3.623	1.752		1.926		2.344		-		2.344	0.000	9.645	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	Various	Aberdeeen Test Center (ATC), Yuma Test Center (YTC) : Various	0.502	0.010	Sep 2020	0.497	May 2021	5.409	Aug 2022	-		5.409	0.000	6.418	-
		Subtotal	0.502	0.010		0.497		5.409		-		5.409	0.000	6.418	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	37.652	64.006		121.811		108.954		-		108.954	0.000	332.423	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

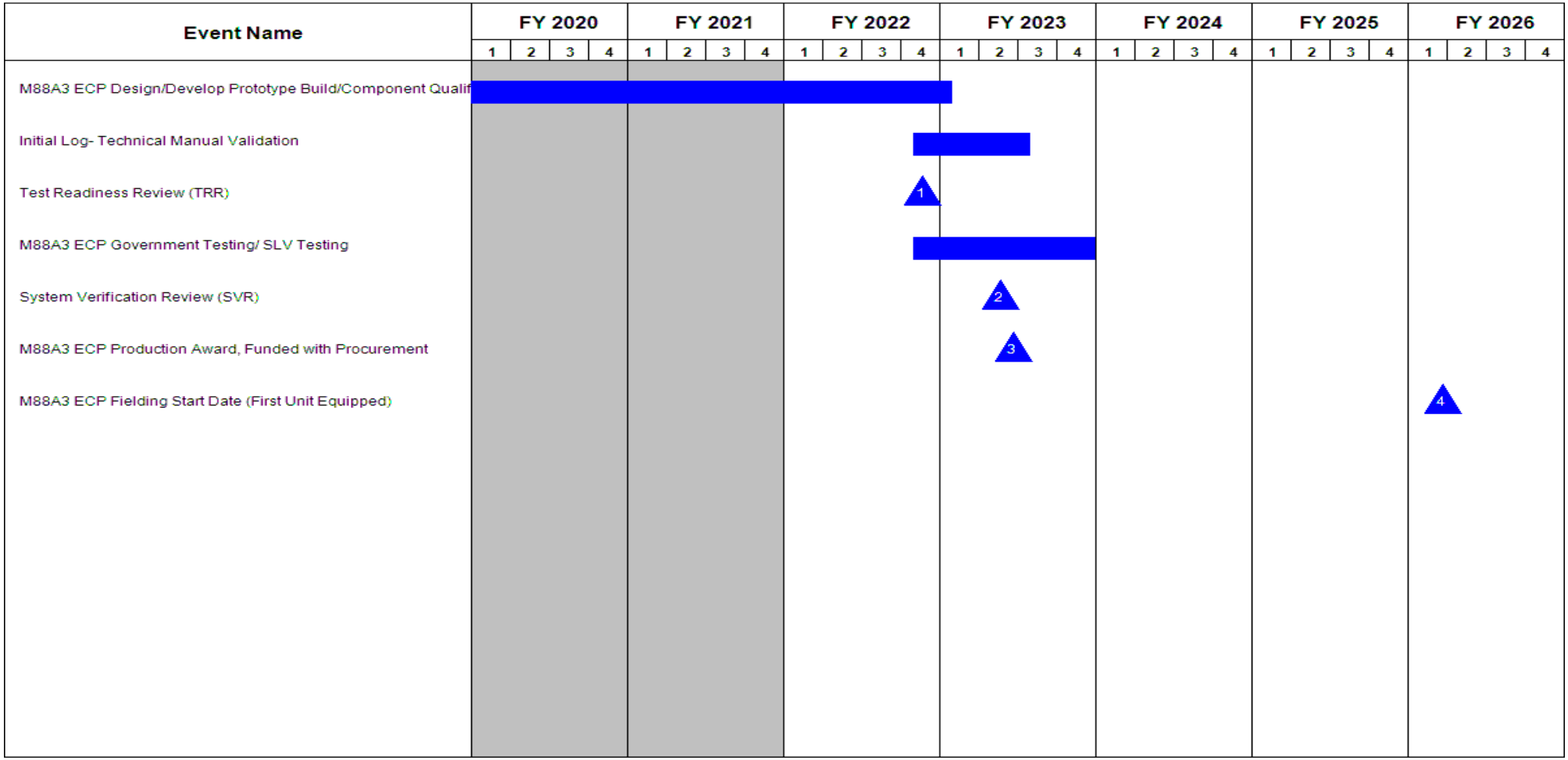


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
M88A3 ECP Design/Develop Prototype Build/Component Qualification	4	2019	1	2023
Initial Log- Technical Manual Validation	4	2022	3	2023
Test Readiness Review (TRR)	4	2022	4	2022
M88A3 ECP Government Testing/ SLV Testing	4	2022	4	2023
System Verification Review (SVR)	2	2023	2	2023
M88A3 ECP Production Award, Funded with Procurement	2	2023	2	2023
M88A3 ECP Fielding Start Date (First Unit Equipped)	1	2026	1	2026

Note

Survivability, lethality and vulnerability (SLV) Testing

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 330 / *Abrams Tank Improve Prog*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
330: *Abrams Tank Improve Prog*	-	114.723	61.039	50.331	-	50.331	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Army has approved Engineering Change Proposals (ECPs) for the Abrams Main Battle Tank to restore lost capability, host inbound technologies, and to meet objective performance requirements called out in approved platform requirements documents. The strategy for Abrams will focus on incrementally delivering capability to the warfighter to meet both near-term limitations as well as mitigating gaps and maintaining combat overmatch in the future. This approach was approved by the Army Acquisition Executive in 3rd Quarter (Q) Fiscal Year (FY) 2011.

The Abrams vehicle is at or exceeds Space, Weight, and Power-Cooling (SWaP-C) limitations. In order to restore lost platform capability, the Abrams Tank will execute a series of ECPs to support the current embedded systems and to facilitate integration of technologies currently in development. The ECPs are not intended to exceed the operational capability outlined in current system requirements documents, but rather to ensure that the existing system performance is not further degraded and that Army mission equipment packages can be integrated on the Abrams. The ECPs will incorporate lost power generation and distribution technologies, lethality improvements, force protection and survivability improvements to counter evolving threats to include, but not limited to Active Protection Systems, technologies to mitigate obsolescence issues, in-bound technologies under development, technologies to decrease the overall weight of the tank, and technologies in support of any validated Army requirement.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Abrams Power Engineering Change Proposal M1A2SEP V3/ECP 1A ***Description:*** The improvements implemented through the M1A2SEP (System Enhancement Program) v3/ECP 1A Abrams Power program will restore lost power generation and distribution, mitigate impending obsolescence, and incorporate inbound technologies currently under development.	8.340	-	-
Title: Abrams Lethality Engineering Change Proposal M1A2SEP V4/ECP 1B ***Description:*** The Abrams SEP (System Enhancement Program) v4 program consists of lethality improvements primarily focused on the integration of 3rd Generation Forward Looking Infrared (FLIR). Additional improvements include a Laser Warning Receiver (LWR), Improved Thermal Management System (ITMS), and target acquisition sensor upgrades consisting of inclusion of color cameras, laser capabilities, and image processing. Other potential improvements include vehicle smoke generation, survivability enhancements, signature management improvements, embedded training enhancements, 360 Situational Awareness cameras, and weight reduction efforts. Trade studies, analysis and technology maturation will be performed to evaluate prospective improvements, along with obsolescence mitigation, and incorporation of inbound technologies currently under development.	88.181	49.619	39.832

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: The program will complete prototype vehicle build, component qualification testing, and Original Equipment Manufacturer (OEM) vehicle testing. The USG will conduct a Test Readiness Review (TRR) in preparation to begin USG vehicle testing in FY 2022. ***FY 2022 Plans:*** As a result of late contractor deliveries the prototype vehicle build and component qualification testing will continue longer than originally expected and delay the start of Original Equipment Manufacturer (OEM) vehicle testing until late FY 2022. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding is decreased to the minimum amount owed on the SEPv4 development contract. The total amount is lower due to all prototype materials being ordered in prior years and transitioning primarily to labor to complete build and test of prototype vehicles.			
Title: Program Management Office (PMO) Support ***Description:*** Program Management Office Support includes Systems Engineering and Government and Contractor salaries, travel and other support costs required to effectively manage the program. ***FY 2021 Plans:*** Will continue Government Systems Engineering and Program Management office support in FY 2021. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2022 Plans:*** Continue Government Systems Engineering and Program Management office support in FY 2022. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** PMO Support decreased in line with overall program amount.	5.542	5.760	4.800
Title: Test & Evaluation ***Description:*** Test and Evaluation activities includes contractor and government testing, as well as test documentation development. Contractor shakedown/proveout testing will be conducted using U.S. Army test facilities. Government development testing of prototype vehicles will evaluate vehicle performance, to include Reliability, Availability, and Maintainability testing. Early User evaluation will also be performed. Test and evaluation activities also include the testing of other platform inbound technologies, along with the development of test documentation to include Test and Evaluation Master Plans, test procedures, and reports.	5.226	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Test & Evaluation - Engineering Change Proposal M1A2SEP V4/ECP 1B ***Description:*** Comprises government test and evaluation of the SEP (System Enhancement Program) v4. Testing includes developmental, operational, and live fire test and evaluation. Government test modeling and simulation, detailed vehicle test planning, and initial test site preparation are also included. ***FY 2021 Plans:*** Continues preparation of SEPv4 testing with live fire modeling and simulation, detailed developmental test planning, and test site preparation (spares, test equipment, instrumentation, etc.). ***FY 2022 Plans:*** Finalize preparation and planning of SEPv4 testing and continue live fire modeling and simulation. Begin test site support of Original Equipment Manufacturer (OEM) testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** SEPv4 test cost increases slightly as vehicle deliveries to test sites compressed and activities conducted in parallel to ensure OEM test support initiates in late FY 2022.	4.749	3.125	3.729
Title: Lethality and Survivability Enhancements ***Description:*** Enhances lethality primarily through integration of improved munitions (smart rounds), gun turret drive improvements, cannon improvements, image processing enhancements and advanced algorithms. Survivability enhancements will focus on improved sensors, 360 Situational Awareness, active protection systems, armor improvements, and unmanned system defeat. Mobility enhancements will focus on efforts to reduce the weight of the tank to ensure operational mobility. ***FY 2021 Plans:*** Abrams will continue the integration of next generation smart rounds, survivability enhancements, and improved sensors. ***FY 2022 Plans:*** Abrams will initiate trade study to identify and evaluate technology that has the potential to reduce the weight of the tank to ensure operational mobility. Abrams to conduct trade study to investigate potential technology integration pathways that may reduce the increasing cognitive burden upon tank crew. Abrams continues integration of survivability enhancements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decreased to minimum trade study and survivability enhancement integration as a result of decrement to overall program amount.	2.685	2.535	1.970
Accomplishments/Planned Programs Subtotals	114.723	61.039	50.331

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GA0700: *M1 Abrams Tank (MOD)*	325.292	375.107	-	-	-	-	-	-	-	-	-
• GA0750: *Abrams Upgrade Program*	1,746.007	968.094	981.337	-	981.337	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Abrams SEP (System Enhancement Program) v3: Research & Development Contract - Sole Source, Cost Plus Incentive Fee (CPIF); SEP v4 - Research & Development Contract - Sole Source, CPIF.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 330 / *Abrams Tank Improve Prog*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Abrams SEPV3	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	339.032	8.340	Feb 2020	-		-		-		-	0.000	347.372	-
SEPV3 Training Device Upgrades	MIPR	PEO, STRI : Orlando, FL	4.252	-		-		-		-		-	0.000	4.252	-
Abrams SEPV4	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	231.182	88.131	Nov 2019	49.619	Feb 2021	39.832	Feb 2022	-		39.832	Continuing	Continuing	Continuing
Advanced Multi-Purpose (AMP) Round	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	7.128	-		-		-		-		-	0.000	7.128	-
Lethality and,Survivability Enhancements	Option/ Various	Various : Various	9.200	2.685	Mar 2020	2.535	Mar 2021	1.970	Jan 2022	-		1.970	Continuing	Continuing	-
		Subtotal	590.794	99.156		52.154		41.802		-		41.802	Continuing	Continuing	N/A

Remarks

Government Testing/SEPV4 includes prior Government testing for prior vehicles and SEPv4 testing projected to begin in FY2021.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Office (PMO) Support	MIPR	PMO Support Offices : TACOM, GVSC, ARDEC, ARL, Picatinny	86.867	5.591	Jan 2020	5.760	Jan 2021	4.800	Jan 2022	-		4.800	Continuing	Continuing	Continuing
Program Management Office (PMO) Support - Survivability Enhancements	MIPR	PMO Support Offices : GVSC/ Various	2.207	-		-		-		-		-	0.000	2.207	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	TBD : TBD	0.160	-		-		-		-		-	0.000	0.160	-
		Subtotal	89.234	5.591		5.760		4.800		-		4.800	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 330 / *Abrams Tank Improve Prog*	

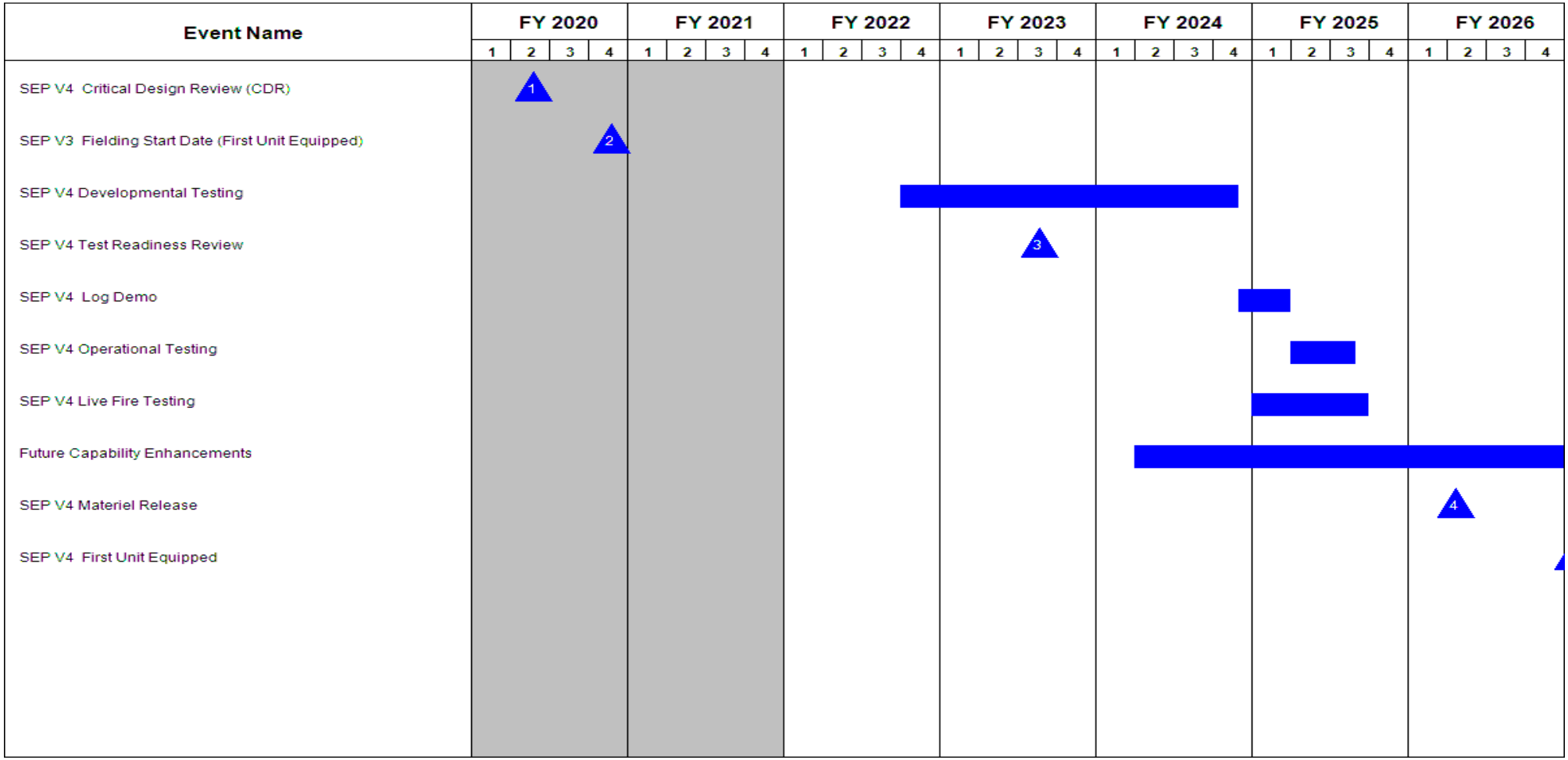
Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Testing / SEPV4	MIPR	Aberdeen Proving Ground; Yuma Proving Ground; White Sands Missile Range, : Various	58.509	3.566	Jan 2020	3.125	Jan 2021	3.729	Jun 2022	-		3.729	Continuing	Continuing	Continuing
Government Testing SEPV3	MIPR	Various : Various	-	2.721	Jan 2020	-		-		-		-	0.000	2.721	-
Contractor Testing SEPV3	SS/CPIF	General Dynamics Land Systems : Various	38.903	1.660	Feb 2020	-		-		-		-	0.000	40.563	-
Contractor Testing SEPV4	SS/CPIF	General Dynamics Land Systems : Various	-	2.029	Nov 2019	-		-		-		-	0.000	2.029	-
Government Testing - Survivability Enhancements	Various	Various : Various	24.491	-		-		-		-		-	0.000	24.491	-
		Subtotal	121.903	9.976		3.125		3.729		-		3.729	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	801.931	114.723		61.039		50.331		-		50.331	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*



Note

SEP (System Enhancement Program)

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
SEP V4 Critical Design Review (CDR)	2	2020	2	2020
SEP V3 Fielding Start Date (First Unit Equipped)	4	2020	4	2020
SEP V4 Developmental Testing	4	2022	4	2024
SEP V4 Test Readiness Review	3	2023	3	2023
SEP V4 Log Demo	4	2024	1	2025
SEP V4 Operational Testing	2	2025	3	2025
SEP V4 Live Fire Testing	1	2025	3	2025
Future Capability Enhancements	2	2024	4	2026
SEP V4 Materiel Release	2	2026	2	2026
SEP V4 First Unit Equipped	1	2027	1	2027

Note

SEP (System Enhancement Program)

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 371 / *Bradley Improve Prog*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
371: *Bradley Improve Prog*	-	45.813	8.773	21.271	-	21.271	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Bradley Fighting Vehicle will continue to be a major combat vehicle in the Army Operational Force for the next 20-25 years. Current modernization efforts, such as the Track and Suspension Engineering Change Proposal (ECP) and the A4 Mobility ECP, address current space, weight, and power-cooling (SWAP-C) limitations. The Bradley will continue to modernize to support additional capabilities required to counter evolving threats in multi-domain operations including, but not limited to improved vehicle diagnostics and systems to increase maintainability, mobility, survivability, sensor digitization, improved power distribution, and cyber and software improvements. These improvements increase the Bradley Fighting Vehicle's ability to survive in a cyber and electronic warfare permissive environment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Bradley Improvements	25.086	5.461	13.322
Description: Provides funding for the analysis, engineering, development, and integration to support Army directed inbound technologies, address critical obsolescence concerns and other improvements to the Bradley vehicles. ***FY 2021 Plans:*** Conducts integration activities for Army directed improvements and inbound technologies such as, but not limited to, power architecture, sensor digitization, force protection, system survivability enhancements, diagnostics, and cyber security. ***FY 2022 Plans:*** Will conduct integration activities for Army directed improvements and inbound technologies such as, but not limited to, Next Generation Automatic Test System (NGATS), power architecture, sensor digitization, and cyber security. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase is due to qualification testing required for the redesigned IBAS and NGATS Bradley specific development.			
Title: Test & Evaluation	7.241	2.226	4.449
Description: Test & Evaluation efforts support developmental and operational test events. These events include test planning, system and subsystem testing, and development of test documentation. ***FY 2021 Plans:*** Provides funding to test additional Bradley modifications to include, but not limited to, diagnostics and vehicle software qualification testing, and sensor digitization. It also provides funding to support test asset overhaul. ***FY 2022 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Provides funding to conduct cyber testing, software development and refurbish/overhaul prototype vehicles due to very high mileage and wear, will refurbish prototype Engineering & Manufacturing Development (EMD) A4 vehicles used during developmental testing (DT). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to higher than previously estimated A4 Prototype overhaul costs on the EMD Test Assets due to excessive wear and tear from continual training.			
Title: Bradley A4 ECP Program ***Description:*** Current projections indicate the Bradley Fighting Vehicle and the Bradley Fire Support Vehicle will remain in the armored brigade combat team (ABCT) formation until the 2050s. Given this, additional Research and Development (R&D) is required to keep the force relevant. The Bradley Fighting Vehicle System (BFVS) improvements implemented through the ECP Program will focus on restoring lost platform capability and provide capacity to support Army inbound technologies and to facilitate integration of technologies currently in development under other existing programs of record. ***FY 2022 Plans:*** Provides funding to support National Maintenance Work Request (NMWR) pilot program to finalize draft NMWR currently in development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to support of the NMWR Pilot program planned for Fiscal Year (FY) 2022.	7.484	-	1.000
Title: Program Management Office (PMO) Support ***Description:*** Program Management Office Support includes systems engineering, government and contractor salaries, travel, training and other support costs required to effectively manage the program. ***FY 2021 Plans:*** Government program management and system engineering support costs. These funds cover the costs of government and direct support contractor salaries, travel, training, supplies, equipment and facilities to manage the issues resulting from Bradley A4 ECP testing and developing logistics products and other development activities. ***FY 2022 Plans:*** Will continue government program management and system engineering support costs. These funds will cover the costs of government and direct support contractor salaries, travel, training, supplies, equipment and facilities to manage the issues resulting from Bradley A4 ECP testing and developing logistics products and other development activities. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	3.473	1.086	2.500

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 to FY 2022 increase is to account for increased personnel support to support additional A4 testing and Improved Bradley Acquisition Subsystem (IBAS) redesign qualification efforts.			
Title: Survivability Enhancements ***Description:*** Developing force protection and survivability improvements to counter evolving threats to include, but not limited to the underbelly interim solution (UBIS). The Bradley Fighting Vehicle (BFV) will integrate underbelly armor for improved survivability against underbelly blast events.	2.529	-	-
Accomplishments/Planned Programs Subtotals	45.813	8.773	21.271

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GZ2400: *Bradley Program (MOD)*	415.740	277.259	461.385	-	461.385	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Product Manager Bradley will execute modification work orders following completion of development to support integrating FY 2022 funded capabilities into the formation at an average rate of three Armored Brigade Combat Teams (ABCT) per year. Software capability upgrades, including cyber, will be included in the next iteration of Voice, Video and Integrated Data (VVID) software in FY 2022 - FY 2024 time frame.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 371 / *Bradley Improve Prog*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Bradley Improvements	MIPR	TBD : TBD	51.681	25.086	Nov 2020	0.534	Sep 2021	13.322	Sep 2022	-		13.322	Continuing	Continuing	Continuing
Bradley A4 Engineering Change Proposal (ECP) Program	MIPR	PMO : Warren, Picatinny NJ	102.401	-		-		1.000	Dec 2022	-		1.000	0.000	103.401	-
Bradley Improvements - IBAS	SS/TBD	DRS : Melbourne, FL	-	-		3.427	Mar 2021	-		-		-	Continuing	Continuing	Continuing
Bradley Imrovements - Power Architecture	SS/TBD	BAE : Sterling Heights, MI	-	-		1.500	Jul 2021	-		-		-	Continuing	Continuing	Continuing
Non Recurring Engineering- Bradley A4 ECP	SS/CPIF	BAE : Sterling Heights, MI	276.530	-		-		-		-		-	0.000	276.530	-
Non Recurring Engineering- Bradley A4 ECP TADDS	TBD	TBD : TBD	-	7.484	Nov 2020	-		-		-		-	0.000	7.484	-
Survability Enhancements - Underbelly Armor	SS/ Various	TBD : TBD	0.207	2.529	Sep 2020	-		-		-		-	0.000	2.736	-
Current Fleet Enhancements	SS/ Various	TBD : TBD	2.580	-		-		-		-		-	0.000	2.580	Continuing
		Subtotal	433.399	35.099		5.461		14.322		-		14.322	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMO/PEO Support/OGA	MIPR	PMO/PEO : Bradley ECP Program	35.521	2.264	Dec 2020	0.594	Sep 2021	1.250	Dec 2022	-		1.250	Continuing	Continuing	Continuing
Government Engineering Support	MIPR	Various : Bradley ECP Program	50.980	1.209	Dec 2020	0.492	Dec 2020	1.250	Dec 2022	-		1.250	Continuing	Continuing	Continuing
FY 2019 Rescission	TBD	FY 2019 Pending Recission : TACOM	25.000	-		-		-		-		-	0.000	25.000	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 371 / *Bradley Improve Prog*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	FY 2018 NDAA SEC 825 MDAP Cost Overrun : TACOM	0.056	-		-		-		-		-	0.000	0.056	-
		Subtotal	111.557	3.473		1.086		2.500		-		2.500	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Testing	MIPR	Various : Test Sites	49.552	7.241	Dec 2020	2.226	Jul 2021	4.449	Jul 2022	-		4.449	Continuing	Continuing	Continuing
		Subtotal	49.552	7.241		2.226		4.449		-		4.449	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	594.508	45.813		8.773		21.271		-		21.271	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

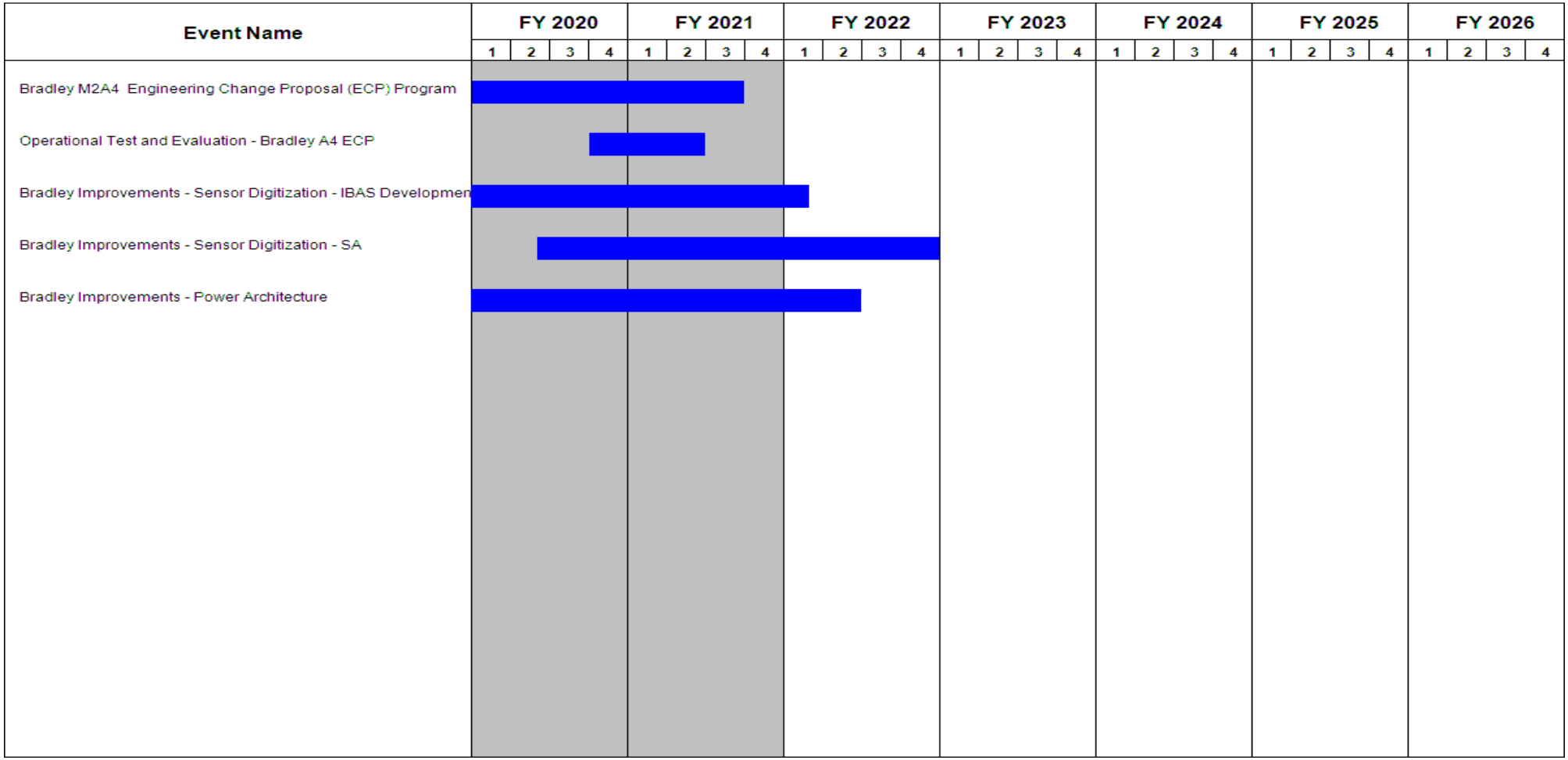


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Bradley M2A4 Engineering Change Proposal (ECP) Program	1	2012	3	2021
Operational Test and Evaluation - Bradley A4 ECP	4	2020	2	2021
Bradley Improvements - Sensor Digitization - IBAS Development	4	2019	1	2022
Bradley Improvements - Sensor Digitization - SA	2	2020	4	2022
Bradley Improvements - Power Architecture	4	2019	2	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) EE2 / *Stryker Improvement*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EE2: *Stryker Improvement*	-	41.655	22.105	30.967	-	30.967	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Stryker Improvement will address the development of Lethality, Survivability, Mobility, Network Lethality, and Communication, Command and Control (C3) improvements within the Stryker Family of Vehicles (FoV). Principal development efforts include upgrades associated with the Stryker Double V-Hull A1 (DVH A1) Engineering Change Proposal (ECP), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS), Common Remotely Operated Weapon Station-Javelin (CROWS-J) ONS, Stryker Survivability Enhancement, and Stryker Lethality ECPs. DVH A1 ECP upgrades restore Stryker DVH Space, Weight, and Power-Cooling (SWaP-C) lost as a result of incorporating vehicle changes to counter threats encountered during deployment operations while allowing the future network to be hosted without further degradation in vehicle protection and mobility. The Stryker 30mm ICVD and CROWS-J ONS efforts addressed Urgent Operational Need to increase the lethality of Stryker Infantry Carrier Vehicles (ICV) within the United States Army European Command (USAREUR). The 30mm ICVD ONS effort integrates a 30mm-equipped weapon station providing, USAREUR with precision direct firepower to overwhelm the enemy in encounter actions and suppressive fire to preserve mounted and dismounted freedom of movement. The Stryker Survivability Enhancements address evolving threats by assessing survivability improvements, to include but not limited to, passive protection systems, active protection systems, an under-armor fire capability for Stryker-equipped reconnaissance troops, 360 Situational Awareness, reactive armor tiles, and integration of emerging and existing technologies such as the Fire Direction Center, Integrated Visual Augmentation System (IVAS), and other Stryker based platform solutions. The Stryker Fire Direction Center (FDC) will provide an on-the move capability that processes voice and digital data while maintaining contact with the indirect fire team over extended distances. Stryker Lethality ECP efforts (30mm Medium Caliber Weapon System (MCWS), CROWS-J, Anti-Tank Guided Missile (ATGM), and other capabilities) focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs). Additionally, the Lethality MEP upgrades will address existing obsolescence issues of the Remote Weapon Station (RWS) with the CROWS and CROWS-J upgrade. The ATGM ECP will upgrade the Modified Improved Target Acquisitions System (MITAS), incorporating a far target locator and enabling the dissemination of target acquirement information utilizing networked lethality, providing a common operating picture. Upgrades of the Stryker flat-bottom hull and DVH variants were completed to mitigate known system deficiencies. The identified deficiencies include, but are not limited to, the Mobile Gun System (MGS) and Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Stryker DVH A1 ECP Development (Engineering/Prototypes)	1.023	-	1.836
Description: The Stryker DVH A1 ECP is a fleet-wide initiative that mitigates mobility degradation caused by survivability improvements. Addresses vehicle space, weight, power, cooling and computing challenges. Returns the performance of the DVH nearly back to the original design capacity and provides approximately 20% growth potential in gross vehicle weight and power generation capacity posturing these vehicles for efficient upgrades in the future.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 Plans: Complete DVH A1 ECP verification and logistics products. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase for DVH A1 ECP verification and logistics products.			
Title: Stryker DVH A1 ECP Testing ***Description:*** Government and Contractor Support for developmental, operational and live fire testing in support of DVH A1 ECP. ***FY 2021 Plans:*** Continue Government and Contractor Support for developmental, operational and live fire testing in support of DVH A1 ECP. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Completion of developmental testing activities.	1.902	0.092	-
Title: Stryker DVH A1 ECP Contractor Support to Test ***Description:*** Contractor support for test activities.	0.212	-	-
Title: Stryker Lethality ECPs Development (Engineering/Protoypes) ***Description:*** Lethality ECPs encompass the integration of a 30 millimeter (mm) Medium Caliber Weapon System (MCWS), under armor Javelin fire capability, improved optics and targeting systems, and other capabilities into the Stryker fleet. These improvements will provide for increased under armor fire capability, target identification range, provide over-match against peer threats and supporting infantry assault, and address obsolescence within the targeting and reconnaissance systems utilized on the Stryker FoV. ***FY 2021 Plans:*** Stryker Lethality ECPs development to include completion of CROWS-J ECP developmental testing and operational assessment, as well as continuing the ATGM ECP logistic products and Medium Caliber Weapon System Bid Sample Assessment to execute testing and operational assessment. ***FY 2022 Plans:*** Continuing Stryker Lethality ECPs development to include completion of CROWS-J ECP and ATGM ECP logistic products. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	0.620	6.097	2.573

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Decrease is due to the completion of developmental efforts and testing for ATGM ECP and CROWS-J ECP in Fiscal Year (FY) 2021, with logistical product development remaining for CROWS-J ECP and AGTM ECP in FY 2022.			
Title: Stryker Lethality ECPs Testing ***Description:*** Government and Contractor Support for developmental, operational and live fire testing in support of Lethality ECPs. ***FY 2021 Plans:*** Construction of the Medium Caliber Weapon System bid sample test report. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease is due to the completion of test report for Medium Caliber Weapon System bid sample in FY 2021.	20.678	2.690	-
Title: Stryker Lethality ECPs Training Devices Updates	0.473	-	-
Title: Stryker Lethality ECPs Contractor Support to Test	3.185	-	-
Title: Government Systems Engineering and Project Management ***Description:*** Government Systems Engineering and Program Management includes salaries, travel and other support costs required to effectively manage all Research, Development, Test, & Evaluation (RDT&E) efforts. ***FY 2021 Plans:*** Continue Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, Survivability Enhancement and Lethality ECPs (CROWS-J, ATGM, and 30mm Medium Caliber Weapon System). Completion of the Medium Caliber Weapon System Source Selection and Evaluation Board (SSEB). ***FY 2022 Plans:*** Continuing Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, Survivability Enhancement, Lethality ECPs (CROWS-J, ATGM, and 30mm Medium Caliber Weapon System) and Fire Direction Center development efforts. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to inflationary adjustments for salaries, travel, training, supplies, and equipment.	10.999	5.387	5.495
Title: Stryker Power System ***Description:*** Development and testing of a non-primary power solution for the Stryker platform. The non-primary power enhancement incorporates multiple components and capabilities, which include, but are not limited to, the battery box container, Auxiliary Power Unit (APU) and interface kits.	1.373	4.168	4.250

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Continuation of testing and logistics products development for the non-primary solution. ***FY 2022 Plans:*** Continuation of testing and logistics products development for the non-primary solution. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to continuation of developmental testing efforts for the non-primary solution.			
Title: Stryker Platform Mission Equipment Packages Integration ***Description:*** Development engineering of Mission Equipment Packages (MEP) onto the Stryker platforms. Integration of the Fire Direction Center MEP onto the DVH A1 platform. ***FY 2022 Plans:*** Initiate developmental acquisition and MEP scope for the Fire Direction Center MEP onto a DVH A1 platform. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Begin the Fire Direction Center MEP developmental efforts onto a DVH A1 platform.	-	-	3.221
Title: Stryker Survivability Enhancements ***Description:*** The Stryker Survivability Enhancements will develop strategies, through technical and engineering analyses, for the integration of emerging technologies onto the Stryker Platforms. The Stryker Survivability Enhancements will include, but are not limited to, the Integrated Visual Augmentation System (IVAS), the fleet wide 360 degree Situational Awareness and the integration of the Stryker Reactive Armor Tiles (SRAT) onto the DVH A1 platform. ***FY 2021 Plans:*** Continuation of 360 degree Situational Awareness through DVE Wide enhancements, IVAS efforts, and other emerging technologies onto the DVH A1 platform. ***FY 2022 Plans:*** Continuation of 360 degree Situational Awareness through DVE Wide enhancements and IVAS efforts. Begin development of Stryker Reactive Armor Tiles (SRAT) kit for integration on the DVH A1 platform and other emerging technologies onto the DVH A1 platform. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	1.190	3.671	13.592

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Increase due to the continuation of 360 degree Situational Awareness through DVE Wide enhancements and IVAS efforts, along with beginning development of Stryker Reactive Armor Tiles kit for DVH A1 platforms and other emerging technologies onto the DVH A1 platform.			
Accomplishments/Planned Programs Subtotals	41.655	22.105	30.967

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GM0100: *Stryker (Mod)*	397.687	-	-	-	-	-	-	-	-	-	-
• G85200: *Stryker Upgrade*	513.858	1,164.152	1,005.028	-	1,005.028	-	-	-	-	-	-

Remarks

23 March 2018 Army Requirements Oversight Council (AROC) decision to exchange all remaining flat-bottom brigades results in continuing exchange production beginning in FY 2018 funded in Stryker Upgrade (G85200). Stryker MOD (GM0100) supports Stryker Fleet modifications and Lethality ECP retrofits in FY 2019-2020.

Beginning in FY 2021 the requirements and funding in the Stryker MOD (GM0100) was moved to Stryker Upgrade (G85200).

In FY 2022, funding in the amount of $0.183 million for manpower was realigned to Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

D. Acquisition Strategy

The Stryker ECP 1 effort will buy back the vehicle space, weight, and power margin lost due to the addition of numerous kits in response to eleven years of war (20-combat rotations & 37+ million total miles), in order to allow integration of the future network (as directed by VCSA in August 2011) without further degrading the performance of the platform. In May 2012, Stryker ECP 1 program (Phase I) was approved, permitting preliminary design and integration efforts on both the Flat Bottom (FB) and DVH variants. In March 2013, Phase II was approved continuing design and integration of ECP 1 mechanical power, electrical power generation, chassis upgrades, and the in-vehicle network upgrades. Based on additional testing conducted in the summer of 2013, the decision was made to focus ECP 1 efforts on the DVH platform and defer efforts on flat-bottom Stryker vehicles. The effort has subsequently been renamed the Stryker DVH A1 ECP. The DVH A1 ECP Phase II contract, awarded November 25, 2013, continued development engineering, prototype build test and evaluation. The initial DVH A1 ECP production contract was awarded in October 2016 (Sole-Source Firm Fixed Price arrangement). A second and third buy of DVH A1 ECP vehicles was awarded as a Fixed Price Incentive Fee arrangement. A March 2018 AROC decision was made to pure fleet the Stryker brigades to DVH with the initial approval for 6 DVH A1 brigades. The objective acquisition strategy is to annually procure 1/2 of a brigade.

On July 2, 2015, Army Systems Acquisitions and Review Council (ASARC) authorization was granted to execute the Stryker 30mm ICVD ONS effort. 30mm ICVD Engineering, Manufacturing, and Development (EMD) contracts for Non-Recurring Engineering (NRE) and Logistics Products Development/Test Support were awarded

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

in January 2016 and May 2016, respectively (Cost Plus Incentive-Fee basis). The 30mm ICVD ONS Production/Retrofit contract was awarded in May 2016 through an Undefinitized Contract Action (UCA). Definitization of the Fixed Price Incentive Fee (FPIF) Production contract occurred in March 2017.

The Stryker Lethality ECP efforts will focus on the integration of a suite of complementary Mission Equipment Package MEP lethality upgrades, which include the 30mm Medium Caliber Weapon System, CROWS-J, ATGM target acquisition optics, integration of emerging and existing technologies such as the Fire Direction Center requirement, Integrated Visual Augmentation System (IVAS), and other Stryker-based platform solutions, as well as additional capabilities that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's SBCTs. Army Acquisition Executive (AAE) approval to initiate the Stryker CROWS-J and ATGM ECP efforts was received in a September 30, 2016 Acquisition Decision Memorandum (ADM). A 30mm Medium Caliber Weapon System (MCWS) decision was made in March 2019. The 30mm MCWS effort awarded design studies to multiple vendors and is evaluating the bid samples requested for production award to determine if there is a vehicle that is ready for production. If none of the bid samples are production ready, then additional design/development will be required beginning in FY 2021 . To improve platform survivability fleet wide, 360 Situational Awareness is being developed by integrating existing technologies, for fleet wide installation over a period of six years to allow the occupants during both open and closed hatch operations to visualize their immediate surrounding while stationary and on the move in adverse weather conditions.

In 2016, the Army approved the FDC requirement and the Field Artillery Battalion TAC using excess Flat Bottom Hull (FBH) Stryker during Force Design Update (FDU) process. Following the March 2018 Pure fleet AROC decision, Force Design Division (FDD) identified the Double V Hull A1 (DVH A1) as the platform for the FDC.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) EE2 / *Stryker Improvement*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker 30mm ICVD ONS LethalityProject Management	MIPR	PEO GCS/TACOM : Sterling Heights, MI	9.602	-		-		-		-		-	0.000	9.602	-
Survivability Enhancement Government Engineering and Project Management	MIPR	PEO GCS/TACOM : Various	0.534	-		-		-		-		-	0.000	0.534	-
Project Management Office (PMO)	MIPR	PEO GCS/TACOM : Various	56.811	10.999	Jan 2020	5.387	Jan 2021	5.495	Jan 2022	-		5.495	23.959	102.651	-
FY2018 NDAA SEC 825 MDAP Cost Overrun	Allot	ASAALT : Huntsville, Alabama	0.029	-		-		-		-		-	0.000	0.029	-
		Subtotal	66.976	10.999		5.387		5.495		-		5.495	23.959	112.816	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker DVH A1 ECP Development	SS/CPIF	GDLS, MI : Various	173.629	1.023	Jan 2020	-		1.836	Jan 2022	-		1.836	0.000	176.488	-
Stryker DVH A1 ECP Training Device Updates	MIPR	PEO STRI, FL : Various	0.020	-		-		-		-		-	0.000	0.020	-
Stryker 30mm ICVD ONS Development	SS/CPIF	GDLS, MI : Various	75.412	-		-		-		-		-	0.000	75.412	-
Stryker Lethality ECPs Development	C/Various	PM CSW; PM CCWS : Various	50.429	0.620		6.097	Jan 2021	2.573	Jan 2022	-		2.573	0.652	60.371	-
Stryker Lethaliy ECPs Training Device Updates	MIPR	PEO STRI, FL : Various	0.335	0.473		-		-		-		-	0.000	0.808	-
Stryker Survivability Enhancement	Various	US Army TARDEC, Various : Sterling Heights, MI	2.066	0.978	Jan 2020	0.100	Jan 2021	12.286	Jan 2022	-		12.286	9.401	24.831	-
Stryker Power System Development	MIPR	US Army TARDEC, Various : US Army TARDEC	7.269	0.115	Jan 2020	1.289	Jan 2021	2.375	Feb 2022	-		2.375	0.375	11.423	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) EE2 / *Stryker Improvement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker Wireless Intercom Development	C/CPFF	Ricardo Defense : Washington DC	4.934	-		-		-		-		-	0.000	4.934	-
Stryker Fire Direction Center Variant Development	TBD	TBD : TBD	-	-		-		3.221	Jun 2022	-		3.221	13.546	16.767	-
		Subtotal	314.094	3.209		7.486		22.291		-		22.291	23.974	371.054	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker DVH A1 ECP Testing	MIPR	Army Test Centers : Various	41.645	1.902	Jun 2020	0.092	Jan 2021	-		-		-	0.000	43.639	-
Stryker DVH A1 ECP Contractor Support to Test	SS/CPFF	GDLS, MI : Various	39.982	0.212	Jun 2020	-		-		-		-	0.000	40.194	-
Stryker 30mm ICVD ONS Test	MIPR	Army Test Centers : Various	20.335	-		-		-		-		-	0.000	20.335	-
Stryker 30mm ICVD ONS Contractor Support to Test	SS/CPFF	GDLS, MI : Various	25.631	-		-		-		-		-	0.000	25.631	-
Stryker Lethality ECPs Testing	MIPR	Army Test Centers : Various	8.388	20.678	Jun 2020	2.690	Dec 2020	-		-		-	0.000	31.756	-
Stryker Lethality ECPs Contractor Support to Test	MIPR	Various : Various	7.820	3.185	Jun 2020	-		-		-		-	0.000	11.005	-
Stryker Survivability Enhancement	MIPR	Army Test Centers : Various	-	0.212	Jun 2020	3.571	Dec 2020	1.306	Dec 2021	-		1.306	2.400	7.489	-
Stryker Power System Testing	MIPR	Army Test Centers : Various	1.721	1.258	Feb 2020	2.879	Dec 2020	1.875	Dec 2021	-		1.875	1.125	8.858	-
Stryker Wireless Intercom Testing	MIPR	Army Test Centers : Various	0.005	-		-		-		-		-	0.000	0.005	-
		Subtotal	145.527	27.447		9.232		3.181		-		3.181	3.525	188.912	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) EE2 / *Stryker Improvement*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	526.597	41.655		22.105		30.967		-		30.967	51.458	672.782	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

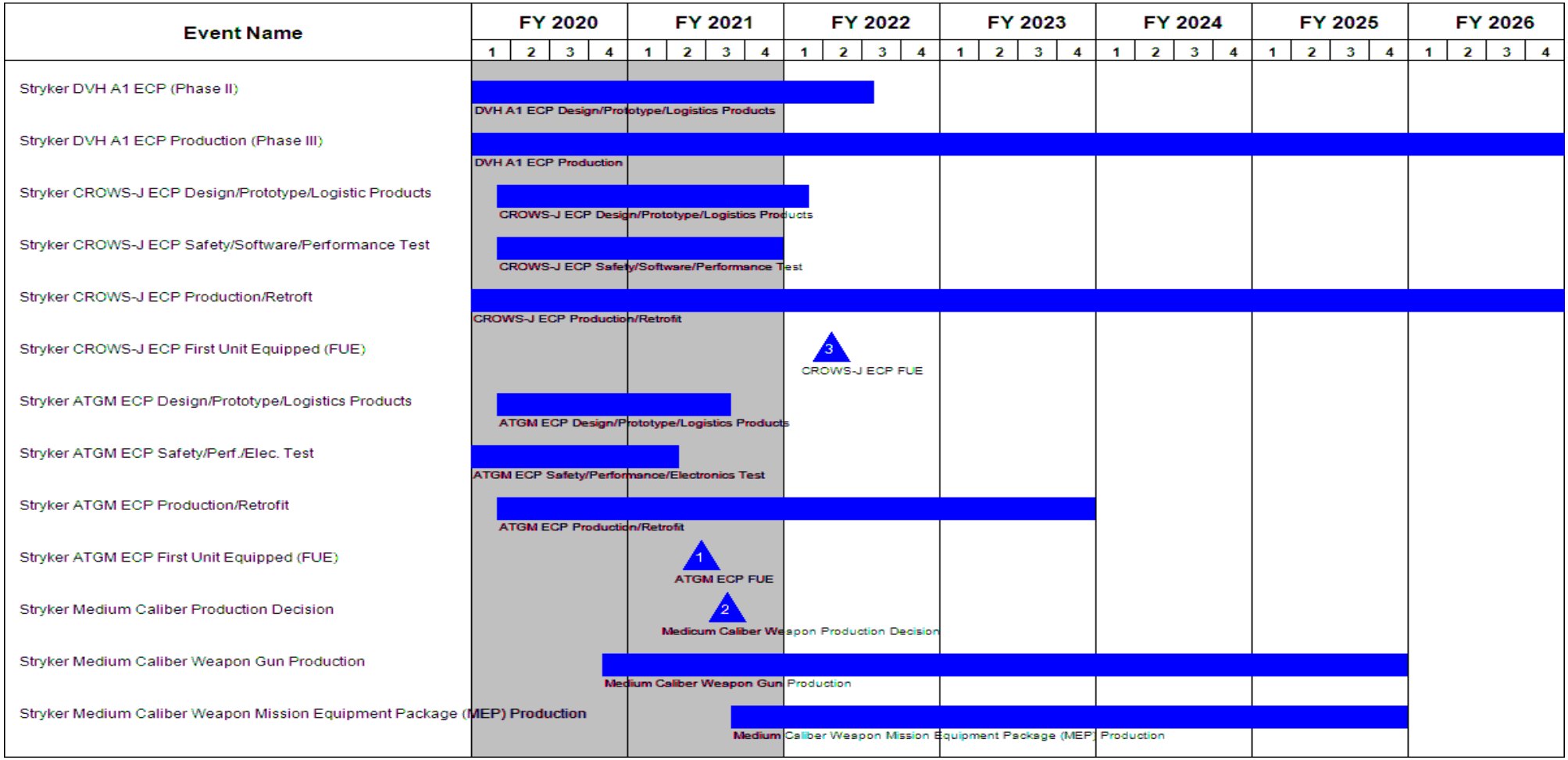


Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

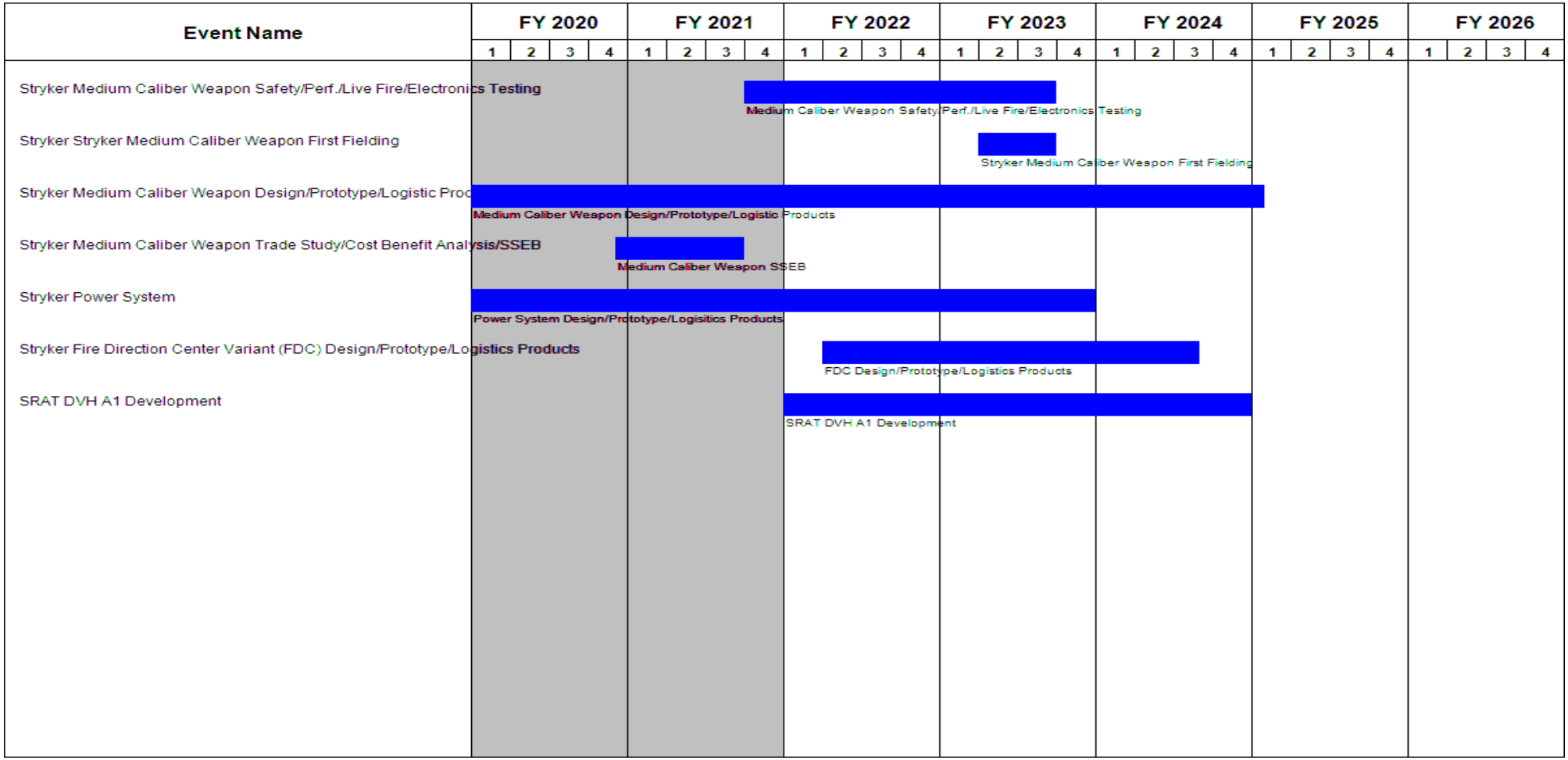


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Stryker DVH A1 ECP (Phase II)	1	2014	3	2022
Stryker DVH A1 ECP Production (Phase III)	1	2017	4	2030
Stryker CROWS-J ECP Design/Prototype/Logistic Products	1	2019	1	2022
Stryker CROWS-J ECP Safety/Software/Performance Test	1	2019	4	2021
Stryker CROWS-J ECP Production/Retroft	3	2019	4	2029
Stryker CROWS-J ECP First Unit Equipped (FUE)	2	2022	2	2022
Stryker ATGM ECP Design/Prototype/Logistics Products	1	2018	3	2021
Stryker ATGM ECP Safety/Perf./Elec. Test	4	2019	2	2021
Stryker ATGM ECP Production/Retrofit	1	2020	4	2023
Stryker ATGM ECP First Unit Equipped (FUE)	2	2021	2	2021
Stryker Medium Caliber Production Decision	3	2021	3	2021
Stryker Medium Caliber Weapon Gun Production	4	2020	4	2025
Stryker Medium Caliber Weapon Mission Equipment Package (MEP) Production	3	2021	4	2025
Stryker Medium Caliber Weapon Safety/Perf./Live Fire/Electronics Testing	4	2021	3	2023
Stryker Stryker Medium Caliber Weapon First Fielding	2	2023	3	2023
Stryker Medium Caliber Weapon Design/Prototype/Logistic Products	2	2019	1	2025
Stryker Medium Caliber Weapon Trade Study/Cost Benefit Analysis/SSEB	4	2020	3	2021
Stryker Power System	2	2019	4	2023
Stryker Fire Direction Center Variant (FDC) Design/Prototype/Logistics Products	2	2022	3	2024
SRAT DVH A1 Development	1	2022	4	2024

Note

Schedule includes the major Stryker RDTE and Procurement (WTCV) funded activities.