Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604182A / *Hypersonics*							
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	-	394.619	832.166	300.928	-	300.928	-	-	-	-	-	-
HX1: *Long-Range Hypersonic Weapon*	-	394.619	832.166	300.928	-	300.928	-	-	-	-	-	-

Note

This funding will transition the Budget Activity (BA) 4 activities managed by the Rapid Capabilities and Critical Technologies Office (RCCTO) within Program Element (PE) 0604182A / Hypersonics to a Program of Record managed by Program Executive Office (PEO) Missiles and Space within PE 0605232A / Hypersonics EMD.

A. Mission Description and Budget Item Justification

The Program Element (PE) 0604182A Hypersonics funds the Rapid Capabilities and Critical Technologies Office (RCCTO) hypersonic effort. This includes the development and prototype fielding of HX1 Long-Range Hypersonic Weapon to suppress adversary Long Range Fires and engage other high payoff/time critical targets.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	404.000	801.417	526.501	-	526.501
Current President's Budget	394.619	832.166	300.928	-	300.928
Total Adjustments	-9.381	30.749	-225.573	-	-225.573
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	60.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-9.381	-29.251			
• Adjustments to Budget Years	-	-	-225.573	-	-225.573

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: HX1: *Long-Range Hypersonic Weapon*		
Congressional Add: *Transfer from RDTE, DW line 124*	31.000	-
Congressional Add: *Program increase*	130.000	-
Congressional Add: *Program increase - hypersonic and strategic materials and structures center of excellence*	15.000	-
Congressional Add: *Program increase - hypersonic glide body risk reduction*	-	50.000

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 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604182A *I Hypersonics*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Congressional Add: *Program increase - hypersonic and strategic materials and structures*	-	10.000
Congressional Add Subtotals for Project: HX1	176.000	60.000
Congressional Add Totals for all Projects	176.000	60.000

Change Summary Explanation

The decrease in FY2022 ($225.573M) from the previous President's Budget is due to several factors: ($190M) reallocated to PE 0604644A to support Mobile Intermediate Range Missile (MIRM)/ Medium Range Capability (MRC), ($31.851M) reallocated to PE 0605232A to support subsequent LRHW batteries under the program of record, and ($3.722M) decrease for inflation rates for non-pay and non-fuel purchases.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604182A / *Hypersonics*	Project (Number/Name) HX1 / *Long-Range Hypersonic Weapon*	

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
HX1: *Long-Range Hypersonic Weapon*	-	394.619	832.166	300.928	-	300.928	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This funding will transition the Budget Activity (BA) 4 activities managed by the Rapid Capabilities and Critical Technologies Office (RCCTO) within Program Element (PE) 0604182A / Hypersonics to a Program of Record managed by Program Executive Office (PEO) Missiles and Space within PE 0605232A / Hypersonics EMD.

A. Mission Description and Budget Item Justification

Project HX1 Long-Range Hypersonic Weapon funds the RCCTO to field an experimental prototype Hypersonic Weapon System with residual combat capability at the Battery Level as part of the Strategic Fires Battalion in support of Multi-domain Operations by the end of FY 2023 with initial fielding of all ground support equipment less live rounds by the end of FY 2021. The Long Range Hypersonic Weapon (LRHW) system will provide the Army a prototype strategic attack weapon system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other high payoff/time critical targets. The Army is working closely with the Navy in the development of the LRHW. LRHW is common with the Common Hypersonic Glide Body (CHGB), and the Navy 34.5 inch booster. Additionally, the LRHW will use an existing C2 Network, Advanced Field Artillery Tactical Data System (AFATDS).

In 4Q FY 2019, CHGB Other Transactional Agreement (OTA) with Dynetics Technical Solutions (DTS) was awarded. CHGB production schedule was coordinated across all CHGB partners. Utilization of Navy contract for Army All Up Round and Cannister (AUR+C) completed 1Q FY 2020 with Preliminary Design Review (PDR) completed 2Q FY 2020. For the Integration of the LRHW, OTA award to Lockheed Martin Space on 4Q FY 2019. The Transporter / Erector / Launcher (TEL) PDR completed 2Q FY 2020. In 2Q FY 2020, a successful Flight Experiment (FE-2) with the NAVY was conducted.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Long Range Hypersonic Weapon	218.619	772.166	-
Description: Funding is provided for planning, prototype manufacturing and testing of the Long Range Hypersonic Weapon.			
FY 2021 Plans: During FY 2021, LRHW will conduct a flight test (FT-3). During FY 2021, LRHW subsystems and components will continue fabrication with first articles. First articles will undergo testing and integration culminating in an initial prototype. Concurrent with LRHW prototype manufacturing, flight tests will occur to validate designs of the CHGB and booster stack. Flight test data collected will be used to anchor the system models and simulations. The government will continue to work with industry to expand the industrial base for the Thermal Protection System (TPS).			
FY 2021 to FY 2022 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604182A / *Hypersonics*	**Project (Number/Name)** HX1 / *Long-Range Hypersonic Weapon*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
The $530.17M decrease is due to completion of the procurement of Long Lead Items (LLI) and a decrease in system design efforts. Details of the FY22 plans are depicted below.			
Title: Common Hypersonic Glide Body (CHGB) ***Description:*** This effort is the development, purchase of the hardware, integration, assembly, test and delivery of the Common Hypersonic Glide Body (CHGB) system for the missile. ***FY 2022 Plans:*** Common Hypersonic Glide Body (CHGB): In FY2022, fabrication and assembly of Common Hypersonic Glide Body (CHGB) prototypes will ramp up to support flight test events in FY2022 and FY2023. Primary efforts include material buy and manufacturing, assembly, test and checkout of the CHGB components and subsystems. Additional effort includes initial subassembly acquisition activities for the CHGB assets supporting the Army's first LRHW battery. To support the fabrication of future glide bodies, the CHGB contractor (Dynetics) will finalize the installation of the second production line. The new industry TPS integrator will begin shadowing the Government TPS project office as part of the leader-follower construct to transition production responsibility from a government lab to industry. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.	-	-	21.092
Title: All Up Round and Canister (AUR+C) ***Description:*** This effort is the development, purchase of the hardware, integration, assembly, test and delivery of the All Up Round and Canister. ***FY 2022 Plans:*** In FY2022, fabrication and assembly of AUR+C prototypes will ramp up to support flight test events over FY2022 and FY2023. Fabrication and assembly of AUR+C prototypes ramps up to support delivery of the tactical assets for fielding in FY2023. Primary efforts include assembly, integration, test and checkout of the AUR+C components and subsystems and continued maturation of flight software. Delivery of AUR and Canister hardware for Insensitive Munition and Hazard Classification (IM/HC) testing and execution of IM/HC tests begins. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.	-	-	84.501
Title: Ground Support Equipment (GSE)	-	-	118.784

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604182A / *Hypersonics*	**Project (Number/Name)** HX1 / *Long-Range Hypersonic Weapon*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: This funding is provided for planning, manufacturing and systems integration efforts for the Battery Operations Center (BOC), Transporter Erector Launcher (TEL), and the Fielding and Transition efforts of the LRHW program. ***FY 2022 Plans:*** Supports software and hardware sub-component testing and integration events utilizing Transporter Erector Launcher (TEL) and Battery Operations Center (BOC) driving hardware and software changes. This is done to minimize variables at full scale system testing events to reduce risk during high cost events. Includes weapons systems integration events and ground test events to include TEL, BOC and AUR+C in support of SHOTL, JFC-2 and JFC-3 flight tests followed by post test data analysis and evaluation. New Equipment Training and Contractor Logistics Support for fielded equipment efforts include repair and replace of unique components based on system failures to maintain an Army-required level of operational readiness. Development of the product-level technical data package documenting the design of the TEL and BOC. Software development to incorporate design changes resulting from flight testing as well as user feedback. Engineering support to provide expanded capabilities for wireless communications between the BOC and TELs as well as hardware or software modifications necessary to integrate missile or GSE upgrades. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.			
Title: Test and Evaluation	-	-	76.551
Description: Test and evaluation includes costs of coordination, execution and post test analysis of 4 major flight tests (Flight Test-3, Joint Flight Campaign-1 (JFC-1), JFC-2 and JFC-3). Also provides required support for environmental testing. ***FY 2022 Plans:*** In FY2022, 2 major tests will be executed to include JFC-1 and JFC-2. JFC-1 will be executed in 1Q FY2022. FY2022 costs include Post Flight Test analysis. Test execution of JFC-1 involves a single stool launch of the first production All Up Round (AUR) from Pacific Missile Range Facility (PMRF). JFC-2 will be executed in 4Q FY2022. FY2022 costs include range costs at Cape Canaveral Space Force Station (CCSFS) and support of integration efforts at Lockheed Martin (LM) and Redstone Arsenal (RSA) prior to the flight test. It includes costs of all the sensor, test resources, mission planning and execution costs. JFC-3 will be executed in 2Q FY2023. FY2022 costs include objective development and range costs. Also will conduct Environmental testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604182A / *Hypersonics*	**Project (Number/Name)** HX1 / *Long-Range Hypersonic Weapon*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.			
Accomplishments/Planned Programs Subtotals	218.619	772.166	300.928

	FY 2020	FY 2021
Congressional Add: Transfer from RDTE, DW line 124 ***FY 2020 Accomplishments:*** Transfer from RDTE, DW line 124	31.000	-
Congressional Add: Program increase ***FY 2020 Accomplishments:*** Program increase	130.000	-
Congressional Add: Program increase - hypersonic and strategic materials and structures center of excellence ***FY 2020 Accomplishments:*** Program increase - hypersonic and strategic materials and structures center of excellence	15.000	-
Congressional Add: Program increase - hypersonic glide body risk reduction ***FY 2021 Plans:*** Common Hypersonic Glide Body (CHGB) production will ramp up with the purchase of additional equipment. RCCTO will purchase critical spare parts to offset risk for flight tests. RCCTO will further develop critical skills and infrastructure to increase CHGB rate production and accommodate upgrades and will improve supplier base and manufacturing capabilities. RCCTO will develop automated test equipment and design and develop CHGB test articles for use in CHGB or AUR risk reduction and safety testing. The production engineering effort to make design more affordable will continue.	-	50.000
Congressional Add: Program increase - hypersonic and strategic materials and structures ***FY 2021 Plans:*** Data inputs for the National Hypersonic Materials Database will be provided. Environments and design test matrices will be defined. Materials and fabricate specimens will be purchased. Framework for database will be initialized. Metal materials will be characterized and initial non-metal characterized. Additive manufacturing (metals) research will be conducted. Develop and characterize materials for the Common Hypersonic Glide Body (CHGB) Thermal Protection System (TPS) including Carbon-Carbon and other extreme hi-temp materials will be conducted.	-	10.000
Congressional Adds Subtotals	176.000	60.000

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604182A / *Hypersonics*	**Project (Number/Name)** HX1 / *Long-Range Hypersonic Weapon*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

The Army will field an experimental prototype Hypersonic Weapons System with residual operational capability NLT FY 2023 at the Battery Level as part of the Strategic Fires Battalion in support of Multi-domain Operations. CLS will be provided for one year following the delivery of the first battery. RCCTO uses a combination of Other Transaction Authority's (OTA's) and the Navy Conventional Prompt Strike (CPS) contract with Lockheed Martin. Long lead procurement is required 2 years prior to delivery resulting in a significant ramp up of funding in FY 2021 to meet the FY 2022 manufacturing and FY 2023 fielding requirement. Quick awards of the OTA and Navy CPS contracts ensure procurements are executed with adequate time to execute the funds and program requirements. A SETA contract provides support to the Government Project Office. The PEO MS transition team is currently embedded within RCCTO to ensure an efficient transition in FY 2024 as a program of record.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604182A / *Hypersonics*	Project (Number/Name) HX1 / *Long-Range Hypersonic Weapon*	

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
Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	24.823		28.606		-		-		-	0.000	53.429	-
CHGB: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		6.089		-		6.089	11.659	17.748	Continuing
AUR+C: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		7.424		-		7.424	12.510	19.934	Continuing
GSE: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		9.160		-		9.160	14.281	23.441	Continuing
Test: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		7.002		-		7.002	11.340	18.342	Continuing
		Subtotal	-	24.823		28.606		29.675		-		29.675	49.790	132.894	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
Contracts for technology development, and weapon design, integration, prototyping and testing	C/Various	various : multiple	-	369.796		803.560		-		-		-	0.000	1,173.356	Continuing
CHGB: Dynetics Technical Solution (DTS)	C/CPFF	Manufacturing of the CHGB : Huntsville, AL	-	-		-		5.000		-		5.000	25.997	30.997	Continuing
CHGB: Various	Various	CHGB/TPS : Huntsville, AL	-	-		-		11.577		-		11.577	4.671	16.248	Continuing
AUR+C: Lockheed Martin	C/Various	Manufacturing and delivery of the LRHW booster and	-	-		-		69.553		-		69.553	28.390	97.943	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604182A / *Hypersonics*	Project (Number/Name) HX1 / *Long-Range Hypersonic Weapon*	

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
		canister : Denver, CO													
AUR+C: Various	Various	AUR+C : Multiple	-	-		-		7.523		-		7.523	3.917	11.440	Continuing
GSE: Lockheed Martin	C/CPFF	Software development and maintenance, weapons systems integration, test planning and execution support for JFC-2 and JFC-3 : Huntsville, AL	-	-		-		75.897		-		75.897	98.499	174.396	Continuing
GSE: Various	Various	Ground Spt Equipment : Huntsville, AL	-	-		-		33.727		-		33.727	18.775	52.502	Continuing
		Subtotal	-	369.796		803.560		203.277		-		203.277	180.249	1,556.882	N/A

Remarks

The CHGB contractor, DTS, will be funded by additional customers of the Common Hypersonic Glide Body.

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: Flight Test Planning and Execution	Various	Flight Test Planning and Execution : Various	-	-		-		67.976		-		67.976	5.582	73.558	Continuing
		Subtotal	-	-		-		67.976		-		67.976	5.582	73.558	N/A

	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
Project Cost Totals	-	394.619		832.166		300.928		-		300.928	235.621	1,763.334	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604182A / *Hypersonics*	Project (Number/Name) HX1 / *Long-Range Hypersonic Weapon*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Original breakout of the form is expanded to show more detail. Contracts for technology development and weapon design, integration, prototyping and testing cost category captured under Product Development is broken out into multiple cost categories. Additionally, Government Personnel and Operations Support captured under Management Services is broken out into multiple cost categories.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604182A / *Hypersonics*	**Project (Number/Name)** HX1 / *Long-Range Hypersonic Weapon*

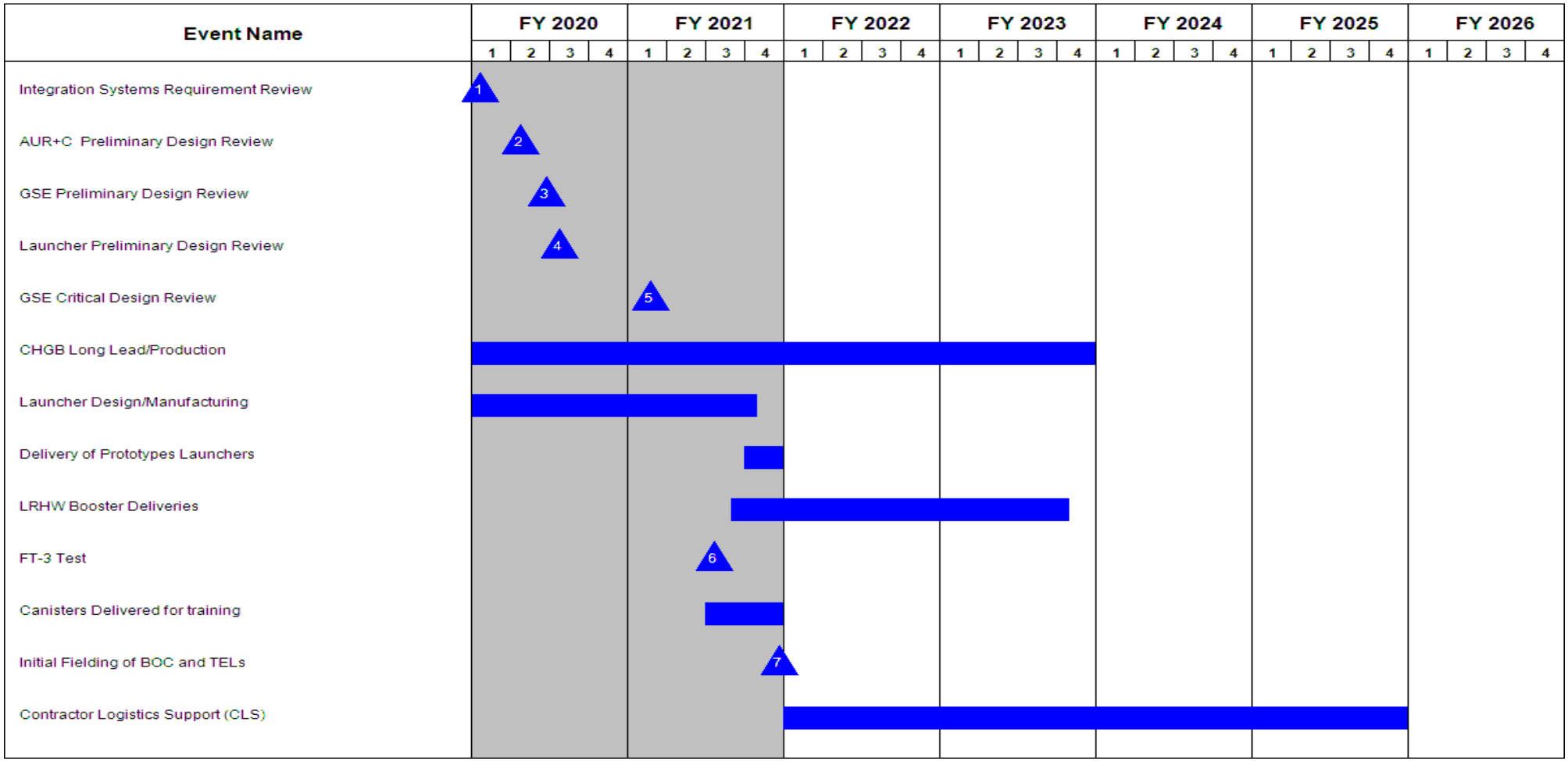

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604182A / *Hypersonics*	**Project (Number/Name)** HX1 / *Long-Range Hypersonic Weapon*

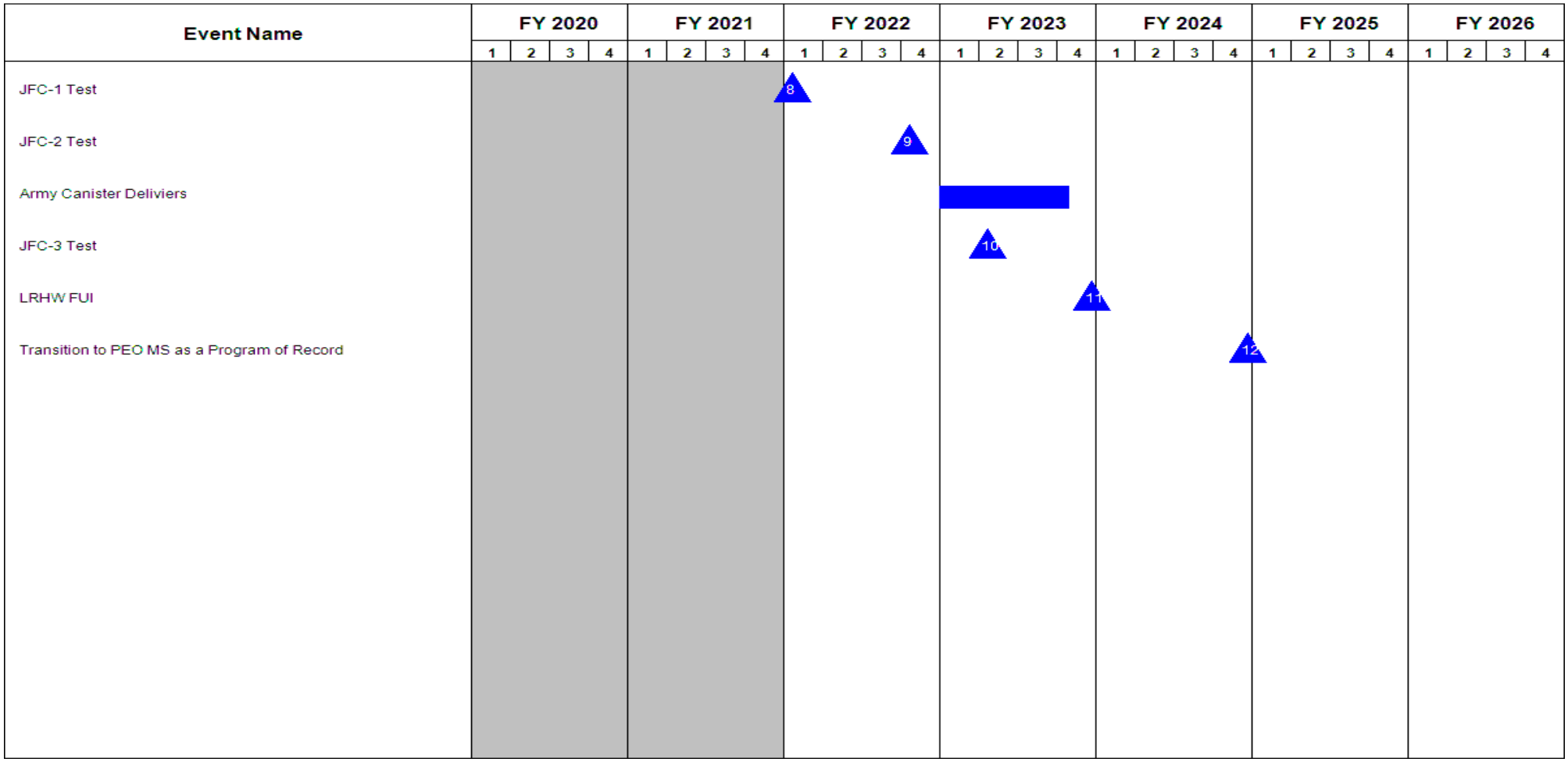

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604182A / *Hypersonics*	**Project (Number/Name)** HX1 / *Long-Range Hypersonic Weapon*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Integration Systems Requirement Review	1	2020	1	2020
AUR+C Preliminary Design Review	2	2020	2	2020
GSE Preliminary Design Review	2	2020	2	2020
Launcher Preliminary Design Review	3	2020	3	2020
GSE Critical Design Review	1	2021	1	2021
CHGB Long Lead/Production	1	2020	4	2023
Launcher Design/Manufacturing	1	2020	4	2021
Delivery of Prototypes Launchers	4	2021	4	2021
LRHW Booster Deliveries	3	2021	4	2023
FT-3 Test	3	2021	3	2021
Canisters Delivered for training	3	2021	4	2021
Initial Fielding of BOC and TELs	4	2021	4	2021
Contractor Logistics Support (CLS)	1	2022	4	2025
JFC-1 Test	1	2022	1	2022
JFC-2 Test	4	2022	4	2022
Army Canister Deliviers	1	2023	4	2023
JFC-3 Test	2	2023	2	2023
LRHW FUI	4	2023	4	2023
Transition to PEO MS as a Program of Record	4	2024	4	2024