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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	115.688	83.952	43.797	-	43.797	25.256	33.421	14.307	7.930	Continuing	Continuing
BV4: <i>Area Protection and Alt Nav Technology Development</i>	-	18.152	16.402	17.617	-	17.617	-	-	-	-	0.000	52.171
ED5: <i>Assured Positioning, Navigation and Timing (PNT)</i>	-	25.459	20.629	-	-	-	-	-	-	-	0.000	46.088
EH8: <i>DISMOUNTED</i>	-	15.313	12.253	10.452	-	10.452	11.126	10.484	6.591	0.958	Continuing	Continuing
EJ2: <i>MOUNTED</i>	-	56.764	34.668	15.728	-	15.728	14.130	22.937	7.716	6.972	Continuing	Continuing

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Assured Positioning, Navigation and Timing modernization priority.

The Assured Positioning, Navigation and Timing (APNT) provides Army ground maneuver forces access to assured PNT under conditions where Global Positioning Systems (GPS) may be limited or denied (jammed and spoofed) in support of the National Defense Authorization Act guidance. APNT products are ruggedized tactical systems that enable Army forces the ability to shoot, move, communicate, thereby allowing forces to maneuver from operational and strategic distances to close with, destroy, and exploit the enemy with sufficient combat power, tempo, and momentum. APNT addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fires, and Command and Control systems that are dependent on accurate Position and Timing, and a foundational Multi-Domain Battle capability to support: calibrated force posture (position and maneuver across strategic distances); multi-domain formations (operate in contested spaces against near-peer adversaries); convergence (continuous integration of capabilities in all domains).

The APNT Program in FY 2023 consists of three Projects; (BV4) Area Protection and Alternative Navigation (ALTNAV) Technology Development, (EH8) Dismounted APNT System (DAPS), and (EJ2) Mounted APNT System (MAPS). There are no Fiscal Year (FY) 2023 Base Research, Development, Test & Evaluation funds requested for Assured Positioning Navigation and Timing (ED5).

Approved Requirements: The Dismounted APNT System (DAPS) Capabilities Development Document (CDD) was Joint Requirements Oversight Council (JROC) approved on 28 January 2022. The Army Requirements Oversight Council (AROC) approved the Mounted APNT System (MAPS) CDD on 12 September 2020. MAPS and DAPS are implementing Congressional and OSD guidance to develop and field Military Code (M-Code) Global Positioning System (GPS) Ground user Equipment. The AROC approved the Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) Mounted Form Factor (CMFF) Abbreviated Capabilities Development Document (A-CDD) on 04 January 2021. In support of House Report 116-442, 2020, the program will prototype modular cards and software according to the Modular Open System Approach (MOSA) standards, for future modernization and new weapons systems. On 31 January, 19 March, and 10 August 2019, the MAPS, DAPS, and Alternative Navigation (ALTNAV) Directed Requirements were approved, respectively. An abbreviated Capabilities Development Document (A-CDD) for the ALTNAV capability is drafted and in staffing. Joint Requirements Oversight

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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Council Memo (JROCM) 049-10, dated 05 April 2010, approved the PNT Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT.

(BV4) - The Area Protection and Alternative Navigation (ALTNAV) Technology Development project enables the effective transition of technologies from industry, academia, and government Science & Technology organizations, and consequent development of alternative and complementary PNT technologies for integration into Mounted APNT System (MAPS) and Dismounted APNT System (DAPS) to pace or overmatch current and evolving threats and in support of the National Defense Authorization Act (NDAA) Guidance (2021 NDAA: Section 1611). Area Protection & ALTNAV Technologies will be developed in order to demonstrate Modular Open System Approach (MOSA), Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS), ALTNAV, and Science & Technology emerging complementary PNT.

(EH8) - The DAPS meets congressional (10 USC 2281) and Department of Defense guidance to provide resilient, survivable, M-Code Global Positioning System (GPS) capable Ground User Equipment (MGUE) receivers. The DAPS will provide Soldiers Assured PNT (APNT) information utilizing various sources of PNT data to address multiple threats and ensure mission success where Global Positioning System (GPS) may be limited or denied. DAPS will deliver APNT in an optimized form factor that supports dismounted mission profiles in denied environments.

(EJ2) - The MAPS meets congressional (10 USC 2281) and Department of Defense guidance to provide resilient, survivable, M-Code Global Positioning System (GPS) capable Ground User Equipment (MGUE) receivers. The MAPS will deliver systems that provide the Army's combat forces access to assured PNT information under conditions where space-based GPS may be limited or denied to enable Army forces the ability to move, shoot, communicate, and provide situational awareness.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	115.688	96.679	0.000	-	0.000
Current President's Budget	115.688	83.952	43.797	-	43.797
Total Adjustments	0.000	-12.727	43.797	-	43.797
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-11.884			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	43.797	-	43.797
• FFRDC Transfer	-	-0.843	-	-	-

Change Summary Explanation

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				Project (Number/Name) BV4 / Area Protection and Alt Nav Technology Development			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BV4: Area Protection and Alt Nav Technology Development	-	18.152	16.402	17.617	-	17.617	-	-	-	-	0.000	52.171
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The primary focus of Area Protection and Alt Nav Technology Development is to enable the effective transition of incremental and disruptive technologies to fieldable Positioning, Navigation and Timing (PNT) solutions to pace or overmatch current and evolving threats in support of the National Defense Authorization Act (NDAA) Guidance (2021 NDAA: Section 1611).

This project supports the Alternative Navigation (ALTNAV) capability and complementary PNT technologies. ALTNAV provides frequency and source diversity that enables Army users access to accurate and assured position and time information in GPS denied environments. An Abbreviated Capabilities Development Document (A-CDD) for the ALT NAV capability is drafted and in staffing. Complementary PNT technology includes network integration, installation and testing of the infrastructure capability and user equipment. Other efforts include the continuation of situational awareness development, spectrum modification for PNT solutions, and modeling and simulation support.

Program activities include component maturation, prototyping, and demonstration to bridge the gap between advanced technology development (S&T and Industry) and fieldable products. These activities demonstrate the military utility to enable effective transitions and synergize development across products. Military Global Positioning System (GPS) is limited to specific frequency bands that can be defeated by our enemies.

Modular card prototyping and software development are conducted in accordance with the Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) (Reference House Report 116-442, 2020). Hardware and software technologies will transition to Mounted Assured PNT System (MAPS) and Dismounted Assured PNT System (DAPS) programs of record. These technologies comply with the PNT Reference Architecture and Modular Open System Approach (MOSA) compliant hardware; CMOSS and software frameworks (PNT Operating System (pntOS)), to ensure a plug and play capability.

Fiscal Year (FY) 2023 Base funds in the amount of \$17.617 Million support ALTNAV Enterprise Ground Control Segment Development and Testing, CMOSS PNT card prototyping, and development, engineering demonstrations and testing.

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

	FY 2021	FY 2022	FY 2023
Title: Area Protection & Alt Nav Technology Development	18.152	15.799	17.617
Description: The effort supports complementary and Alternative Navigation (ALTNAV) PNT capabilities.			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>FY 2022 Plans: Fiscal Year (FY) 2022 Base funds in the amount of \$15.799 Million support ALTNAV Enterprise Ground Control Segment Development and Testing, CMOSS PNT card prototyping, and development, engineering demonstrations and testing.</p> <p>FY 2023 Plans: Fiscal Year (FY) 2023 Base funds in the amount of \$17.617 Million support ALTNAV Enterprise Ground Control Segment Development and Testing, CMOSS PNT card prototyping, and development, engineering demonstrations and testing.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Funding increased from \$15.799 Million in FY 2022 to \$17.617 Million in FY 2023 for Alternative Navigation (ALTNAV) Ground Control Segment Development and Testing.</p>			
<p>Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)</p> <p>FY 2022 Plans: FY 2022 Base funds in the amount of \$0.603 Million will support Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) reduction.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased from \$0.603 Million in FY 2022 to \$0.000 Million in FY 2023. This decrease is due to Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) reduction.</p>	-	0.603	-
Accomplishments/Planned Programs Subtotals	18.152	16.402	17.617

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EH8: <i>DISMOUNTED</i>	15.313	12.253	10.452	-	10.452	11.126	10.484	6.591	0.958	0.000	67.177
• EJ2: <i>MOUNTED</i>	56.764	34.668	15.728	-	15.728	14.130	22.937	7.716	6.972	Continuing	Continuing
• AW6: <i>Modular GPS Independent Sensors Advanced Tech</i>	10.684	6.791	10.131	-	10.131	12.289	16.702	14.629	20.609	0.000	91.835
• AV8: <i>Navigation Warfare (NAVWAR) Advanced Technology</i>	2.535	1.927	1.949	-	1.949	6.002	3.958	5.985	-	0.000	22.356
• 0603639A: <i>Tank and Medium Caliber Ammunition</i>	106.881	73.844	64.669	-	64.669	78.962	101.511	104.969	105.985	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks
 The project matures prototyping or other demonstrations to prove out technology before it is integrated into a Program of Record (PoR). This is solidified by the following linkage:

- Modular GPS Independent Sensors (AW6)
- Navigation Warfare (AV8)
- Tank and Medium Caliber Ammunition (0603639A)

Linked to:

Area Protection and Alternative Navigation (ALTNAV) technology development (BV4)

Linked to:

Dismounted Assured PNT Systems (EH8)
 Mounted Assured PNT Systems (EJ2)

D. Acquisition Strategy

Alternative Navigation (ALT NAV) and PNT card Technology Development will utilize prototyping, modeling & simulation and test fix test to assess the military utility of advanced component capabilities through critical Soldier touchpoints, laboratory, and field assessments to determine technology maturation for integration into Mounted Assured Positioning, Navigation, and Timing System (MAPS) and Dismounted Assured Positioning, Navigation, and Timing System (DAPS). Alternative Navigation (ALTNAV) Enterprise Capability for both ALT NAV and PNT Cards will be implemented by utilizing a mix of competitive Other Transaction Authority (OTA)'s and Federal Acquisition Regulation contracts. This will rapidly provide incremental capability to use and inform future MAPS and DAPS requirements.

Requirement documents include:

- Abbreviated Capabilities Development Document (A-CDD) for the ALT NAV capability is drafted and in staffing.
- DAPS Capabilities Development Document (CDD), Joint Requirements Oversight Council (JROC) Approved, 28 January 2022.
- Abbreviated Capabilities Development Document (A-CDD) for the Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) Mounted Form Factor, Army Requirements Oversight Council (AROC) approved on 4 January 2021.
- MAPS Capabilities Development Document (CDD), Army Requirements Oversight Council (AROC) Approved, 12 September 2020.
- Alternative Navigation (ALTNAV) DR, 10 August 2019.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) BV4 / Area Protection and Alt Nav Technology Development
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Support	Various	Various : Various	-	0.835	Nov 2020	1.088	Nov 2021	1.112	Nov 2022	-		1.112	0.000	3.035	-
FY 2022 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.603	Mar 2022	-		-		-	0.000	0.603	-
Subtotal			-	0.835		1.691		1.112		-		1.112	0.000	3.638	N/A

Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ALTNAV Enterprise Ground Control Segment	Various	Various : Various	-	1.291	Dec 2020	1.557	Dec 2021	6.883	Dec 2022	-		6.883	0.000	9.731	-
Modular Open System Approach (pntOS & CMOSS)	Various	Various : Various	-	9.309	Nov 2020	6.112	Nov 2021	3.268	Nov 2022	-		3.268	0.000	18.689	-
Subtotal			-	10.600		7.669		10.151		-		10.151	0.000	28.420	N/A

Remarks
 ALTNAV Enterprise Ground Control Segment increases from \$1.5 Million in FY2022 to \$6.883 Million in FY2023 due to all ALTNAV Enterprise activities are now consolidated under Project BV4. Prior to FY23 ALTNAV Enterprise efforts were funded, depending on the scope of work, under either BV4 or ED5 funds.

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Technical Services - Government	Various	C5ISR : Various	-	0.238	Nov 2020	0.123	Nov 2021	0.265	Nov 2022	-		0.265	0.000	0.626	-
Engineering and Technical Services - Contractor	Various	DCS Corporation / MITRE / DOTC : APG, MD	-	4.844	Nov 2020	3.344	Nov 2021	3.760	Nov 2022	-		3.760	0.000	11.948	-
Subtotal			-	5.082		3.467		4.025		-		4.025	0.000	12.574	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) BV4 / Area Protection and Alt Nav Technology Development
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Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluations	Various	Various : Various	-	1.635	Dec 2020	3.575	Dec 2021	2.329	Dec 2022	-		2.329	0.000	7.539	-
Subtotal			-	1.635		3.575		2.329		-		2.329	0.000	7.539	N/A

Remarks
 Test and Evaluation include Open Innovation Lab (OIL), System Integration Lab (SIL), and ALTNAV testing. The Open Innovation Lab (OIL) conducts a recurring series of data driven demonstrations and evaluations of high Technical Readiness Level (TRL) operationally effective PNT solutions that transition to production easily in order to pace/overmatch enemy PNT threat systems.

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	18.152	16.402	17.617	-	17.617	0.000	52.171	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ALTNV Enterprise Ground Control Segment	[Redacted]																											
PNT Technical Demonstrations & Testing	[Redacted]																											
Modular Opens Systems Approach, PNT Operating System & C...	[Redacted]																											
	[Redacted]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ALTNAV Enterprise Ground Control Segment	2	2019	4	2023
PNT Technical Demonstrations & Testing	1	2020	4	2023
Modular Opens Systems Approach, PNT Operating System & CMOSS	1	2021	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
ED5: Assured Positioning, Navigation and Timing (PNT)	-	25.459	20.629	-	-	-	-	-	-	-	0.000	46.088
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Assured Positioning, Navigation and Timing (PNT) project funds the Resiliency and Software Assurance Measures (RSAM) which provides increased capability and situational awareness for fielded legacy military Global Positioning System (GPS) receivers supporting systems and soldiers through at least 2035. Legacy GPS receivers targeted for RSAM enhancements, include but are not limited to, 226,000 Defense Advanced GPS Receiver (DAGR) and 200,000+ embedded Ground Based-GPS Receiver Applications Module (GB-GRAM). RSAM software upgrades mitigate threats to legacy DAGR and GB-GRAM Selective Availability and Anti-Spoof Module (SAASM) based military GPS receivers. RSAM provides an interim solution in a GPS-challenged operational environment until future Positioning, Navigation and Timing (PNT) solutions are fully deployed. RSAM will coordinate integrated software testing with military system managers and the test community to validate software and synchronize RSAM deployment to the user. Additionally, the Assured PNT project supports the Alternative Navigation (ALTNAV) capability that will provide positioning and timing information for navigation for the Army, which completes critical timing and equipment upgrades, and key certification activities. These connections, upgrades, and certification activities are critical to operationalizing ALTNAV as an effective and suitable contingency source of PNT data in the event GPS is denied.

There are no Base funds for project Assured PNT (ED5) in FY 2023. RSAM is transitioning into fielding and sustainment. The ALTNAV ground segment efforts for FY 2023 will transition to Area Protection & Alt Nav Technology (BV4).

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

	FY 2021	FY 2022	FY 2023
Title: Resiliency and Software Assurance Measures (RSAM)	15.206	13.335	-
Description: Funding supports the following efforts:			
FY 2022 Plans:			
FY 2022 base funds in the amount of \$13.335 Million will complete development of RSAM DAGR Update 2 and RSAM GB-GRAM Update 2, to include prototype testing, formal qualification testing, and risk mitigation efforts. RSAM DAGR and RSAM GB-GRAM receiver integration testing efforts for this update will be performed in association with military vehicles and systems.			
FY 2022 to FY 2023 Increase/Decrease Statement:			
There are no Base funds for project Assured PNT (ED5) in FY 2023. Effort ends in FY 2023.			
Title: Assured PNT Enablers	10.253	6.521	-
Description: Assured PNT Enablers.			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>FY 2022 Plans: FY 2022 base funds in the amount of \$6.521 million will support development of Assured PNT enablers to include network integration and certification of ALTNV ground segment.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: There are no Base funds for project Assured PNT (ED5) in FY2023.</p>			
<p>Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)</p> <p>Description: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)</p> <p>FY 2022 Plans: FY 2022 Base funds in the amount of \$0.773 Million will support Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) reduction.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased from \$0.773 Million in FY 2022 to \$0.000 Million in FY 2023. There are no Base funds for Assured PNT (ED5) in FY 2023. Efforts end in FY 2022.</p>	-	0.773	-
Accomplishments/Planned Programs Subtotals	25.459	20.629	-

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• K49010: Mounted/ Dismounted Receivers	5.894	1.990	2.127	-	2.127	2.406	2.429	2.435	2.433	Continuing	Continuing

Remarks
K49010 / Mounted/Dismounted Receivers is an OPA subset of Line Item Number K49000 / Assured Positioning, Navigation and Timing.

D. Acquisition Strategy
Resiliency and Software Assurance Measures (RSAM) will provide software improvements to legacy military GPS receivers by awarding contracts to the original equipment manufacturer and leverage the test community to develop and characterize prototypes and final software solutions.

Assured PNT enablers will provide build, integrate and test the ALTNV enterprise by utilizing a mix of competitive Other Transaction Authority (OTA)'s and Federal Acquisition Regulation contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army												Date: April 2022				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 4				PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				ED5 / Assured Positioning, Navigation and Timing (PNT)								
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Project Management Support	Various	Various : Various	2.693	0.921	Nov 2020	1.456	Nov 2021	-		-		-	0.000	5.070	-	
FY 2022 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.773	Mar 2022	-		-		-	0.000	0.773	-	
Subtotal			2.693	0.921		2.229		-		-		-	0.000	5.843	N/A	
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	1.168	5.750	Nov 2020	2.655	Oct 2021	-		-		-	0.000	9.573	-	
RSAM - GB-GRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	2.902	4.736	Nov 2020	6.117	Nov 2021	-		-		-	0.000	13.755	-	
Assured PNT Enablers	Various	Various : Various	5.177	10.253	Nov 2020	6.521	Nov 2021	-		-		-	0.000	21.951	-	
RSAM - MicroGRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	2.158	-		-		-		-		-	0.000	2.158	-	
Subtotal			11.405	20.739		15.293		-		-		-	0.000	47.437	N/A	
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Engineering and Technical Contracting Services	C/FFP	DCS Corp : APG, MD	9.445	1.558	Jan 2021	0.921	Oct 2021	-		-		-	0.000	11.924	-	
Engineering and Technical Government Services	MIPR	Various : Various	3.049	1.141	Dec 2020	0.998	Nov 2021	-		-		-	0.000	5.188	-	
Subtotal			12.494	2.699		1.919		-		-		-	0.000	17.112	N/A	

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RSAM Update 1																												
	RSAM Update 1																											
RSAM GB-GRAM Software Development & Testing Update 1																												
	GB-GRAM Software Development Update 1																											
Platform Integration Testing Update 1																												
	Platform Integration Testing Update 1																											
RSAM GB-GRAM Update 1 Software Release																												
	GB-GRAM Update 1 Release																											
RSAM Update 2																												
	RSAM Update 2				RSAM Update 2																							
RSAM DAGR Software Development and Testing Update 2																												
	RSAM DAGR Development Update 2				RSAM DAGR Development Update 2																							
RSAM GB-GRAM Software Development and Testing Update 2																												
	RSAM GB-GRAM Development Update 2				RSAM GB-GRAM Development Update 2																							
Platform Integration Testing Update 2																												
					Platform Integration Testing Update 2																							
RSAM DAGR Update 2 Software Release																												
									DAGR Update 2 Release																			
RSAM GB-GRAM Update 2 Software Release																												
													GB-GRAM Update 2 Release															
Assured PNT Enablers																												
	Assured PNT Enablers				Assured PNT Enablers																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RSAM Update 1	1	2019	2	2021
RSAM DAGR Software Development and Testing Update 1	1	2018	4	2020
RSAM GB-GRAM Software Development & Testing Update 1	1	2019	2	2021
Platform Integration Testing Update 1	1	2019	2	2021
RSAM DAGR Software Release Update 1	4	2020	4	2020
RSAM GB-GRAM Update 1 Software Release	2	2021	2	2021
RSAM Update 2	4	2019	4	2022
RSAM DAGR Software Development and Testing Update 2	2	2020	4	2022
RSAM GB-GRAM Software Development and Testing Update 2	4	2020	4	2022
Platform Integration Testing Update 2	3	2021	4	2022
RSAM DAGR Update 2 Software Release	2	2023	2	2023
RSAM GB-GRAM Update 2 Software Release	4	2023	4	2023
Assured PNT Enablers	1	2019	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH8 / DISMOUNTED
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
EH8: <i>DISMOUNTED</i>	-	15.313	12.253	10.452	-	10.452	11.126	10.484	6.591	0.958	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Dismounted Assured PNT (APNT) System (DAPS) will meet congressional (10 USC 2281) and Department of Defense guidance to provide and field Military Code (M-Code) Global Positioning System (GPS) to dismounted Soldiers, Commanders, and applicable End User Devices to provide assured timing and position data necessary to effectively engage targets, share data across the network, and conduct mission command functions. DAPS will deliver APNT in an optimized form factor that supports dismounted mission profiles in denied environments and use cases where mounted APNT solutions are not available. DAPS includes the development of hardware and software to integrate M-Code, GPS, Alternative Navigation (ALTNAV) signals, non-radio frequency (RF) sensors, and other PNT sources to generate and distribute a fused APNT data.

Fiscal Year (FY) 2023 Base funds in the amount of \$10.452 Million will support the completion of engineering development, production and manufacturing readiness as well as Production Qualification Testing (PQT) and Initial Operational Test and Evaluation (IOT&E) in preparation for Full Rate Production Decision 2Q FY2024. Additionally, the DAPS program will develop a Full and Open Competitive Contract Request for Proposal for the next iteration of the DAPS (DAPS Modular Open Systems Approach (MOSA)) form factor.

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

	FY 2021	FY 2022	FY 2023
Title: Dismounted APNT System (DAPS)	15.313	11.805	10.452
Description: This effort supports the DAPS hardware and software development, system engineering and client integration, development and operational testing, and program management efforts.			
FY 2022 Plans: FY 2022 Base funds in the amount of \$11.805 Million will support continued engineering development, production and manufacturing readiness, and Limited User Test in preparation for Milestone C scheduled for 2Q FY 2023.			
FY 2023 Plans: Fiscal Year (FY) 2023 Base funds in the amount of \$10.452 Million supports the completion of engineering development, production and manufacturing readiness for DAPS Program of Record. The Production Qualification Testing (PQT) and Initial Operational Test and Evaluation (IOT&E) will begin in preparation for Full Rate Production Decision 2Q FY2024. Additionally, the DAPS program will develop a Full and Open Competitive Contract Request for Proposal for the next iteration of the DAPS (DAPS Modular Open Systems Approach (MOSA)) form factor.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Funding decreased from \$11.805 Million in FY 2022 to \$10.452 Million in FY 2023. This decrease is due to completion of engineering development and production and manufacturing readiness.			
Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) Description: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased from \$0.448 Million in FY 2022 to \$0.000 Million in FY 2023. This decrease is due to Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) reduction for FY22 in accordance with Title 15 USC ? 638	-	0.448	-
Accomplishments/Planned Programs Subtotals	15.313	12.253	10.452

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• K49020: <i>Dismounted Hub</i>	48.449	30.143	26.769	-	26.769	16.897	65.872	62.201	71.034	Continuing	Continuing
• BV4: <i>Area Protection and Alt Nav Technology Development</i>	18.152	16.402	17.617	-	17.617	-	-	-	-	0.000	52.171

Remarks
K49020 / Dismounted Hub is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

Risk reduction prototyping efforts from 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the Dismounted Assured PNT System (DAPS).

D. Acquisition Strategy
The DAPS acquisition strategy consists of an iterative development security operations (DevSecOps) methodology for the development, testing, production and fielding of a material solution that implements Congressional guidance for M-Code capability (10 USC 2281), Modular Open Systems Approach (Reference House Report 116-442, 2020), and the DAPS Capability Development Document (CDD) (signed 28 January 2022) performance requirements. The DAPS strategy leverages competitive Other Transaction Authority (OTA) agreements and Small Business Innovative Research (SBIR) contracts to assess industry capabilities, develop prototypes, and mature technology upgrades. Developmental test and operational assessment results informed a best value decision in November 2021 for the selected material solution for final engineering development, production and manufacturing readiness, and Limited User Test (LUT). LUT results will inform a major capabilities

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>
<p>acquisition program Milestone C decision in 2Q FY 2023. Following a successful Milestone C decision, the Dismounted Assured PNT (APNT) System (DAPS) program will conduct production qualification testing and an Initial Operational Test and Evaluation (IOT&E) in 1Q FY 2024 to support a Full Rate Production Decision in 2Q FY 2024.</p> <p>The DAPS program will develop a Full and Open Competitive Contract Request for Proposal for the next iteration of the DAPS (DAPS Modular Open Systems Approach (MOSA) form factor. The DAPS Modular Open System Approach (MOSA) form factor is a follow on iteration of the DAPS. The DAPS MOSA form factor will increase the modularity of the DAPS. The increase modularity enables accelerated integration of new and innovative PNT capabilities to pace the threat at reduced non-recurring engineering costs. The DAPS MOSA will use industry small form factor MOSA standards for plug and play capabilities.</p> <p>DAPS requirement documents include:</p> <p>Quick Reaction Capability (QRC): DAPS Directed Requirement (19 Mar 2019), Alternative Navigation Directed Requirement (10 August 2019), APNT Requirements Trace and Concurrence for DAPS with ALTNAV Handheld Devices memorandum (16 April 2020) and DAPS Directed Requirement Addendum (18 May 2021).</p> <p>Program of Record (POR): DAPS Capabilities Development Document (CDD) was Joint Requirements Oversight Council (JROC) approved (28 January 2022).</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)					
2040 / 4				PE 0604120A / Assured Positioning, Navigation and Timing (PNT)						EH8 / DISMOUNTED					
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Management Support	Various	Various : Various	-	0.279	Dec 2020	0.127	Dec 2021	0.113	Dec 2022	-		0.113	Continuing	Continuing	Continuing
FY 2022 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.448	Mar 2022	-		-		-	0.000	0.448	-
Subtotal			-	0.279		0.575		0.113		-		0.113	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
DAPS Prototyping & Engineering Development, Production & Manufacturing Readiness	MIPR	Various : Various	-	9.469	Dec 2020	5.487	Nov 2021	1.674	Dec 2022	-		1.674	Continuing	Continuing	Continuing
Engineering and Technical Product Development	MIPR	C5ISR : APG, MD	-	1.315	Dec 2020	1.185	Dec 2021	1.298	Dec 2022	-		1.298	Continuing	Continuing	Continuing
Subtotal			-	10.784		6.672		2.972		-		2.972	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Services - Government	Various	C5ISR : Various	-	0.280	Nov 2020	0.251	Nov 2021	0.319	Nov 2022	-		0.319	Continuing	Continuing	Continuing
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	0.232	Dec 2020	0.165	Dec 2021	0.293	Dec 2022	-		0.293	Continuing	Continuing	Continuing
Subtotal			-	0.512		0.416		0.612		-		0.612	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>
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Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluations	MIPR	Various : Various	-	3.738	Dec 2020	4.590	Dec 2021	6.755	Mar 2023	-		6.755	Continuing	Continuing	Continuing
Subtotal			-	3.738		4.590		6.755		-		6.755	Continuing	Continuing	N/A

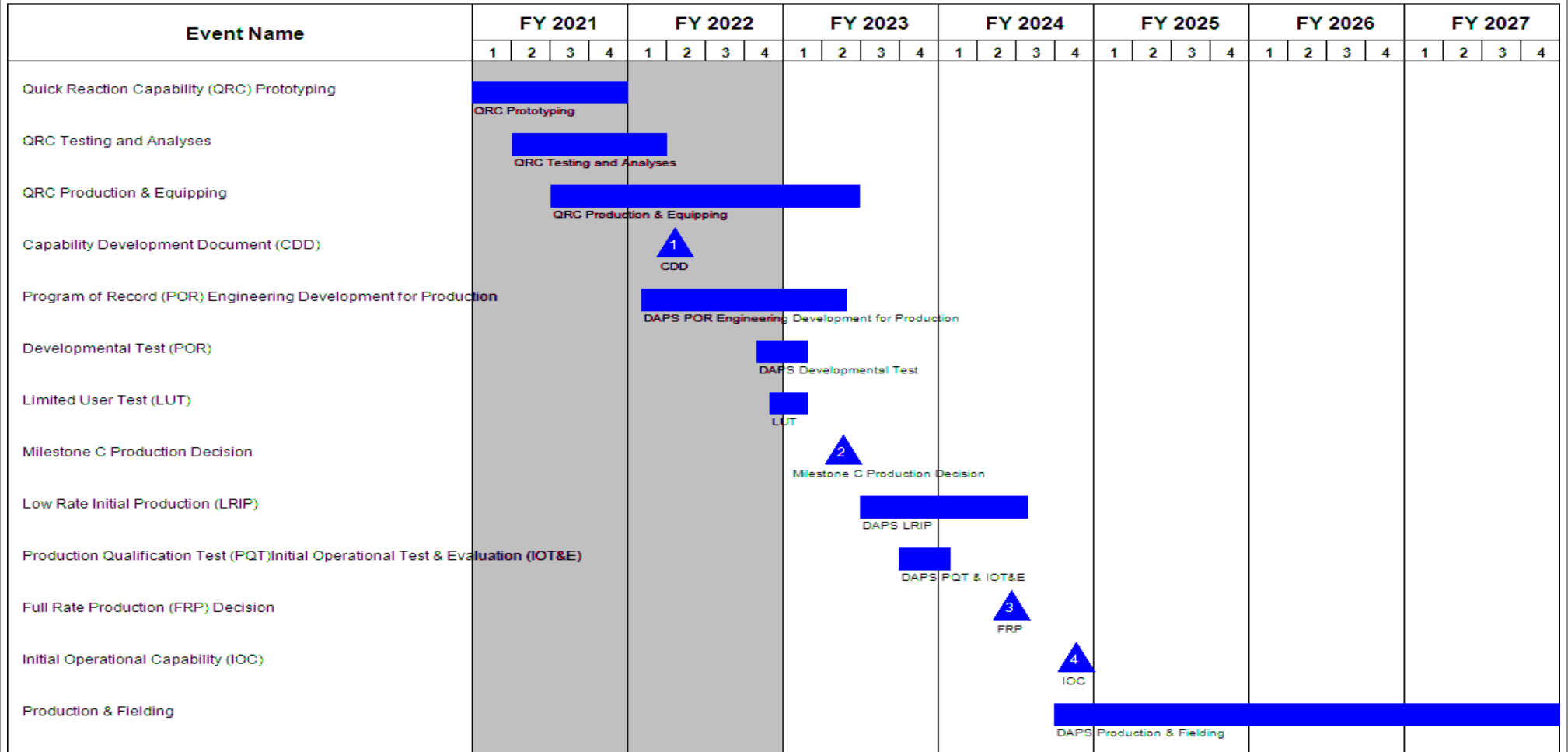
Remarks
Test and Evaluation costs in FY23 increased for Production Qualification Testing (PQT) and Initial Operational Test and Evaluation (IOT&E) in preparation for Full Rate Production 2Q FY2024

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	15.313	12.253	10.452	-	10.452	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>



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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DAPS Modular Open System Approach (MOSA) Form Factor Prototype Development																												
DAPS MOSA Form Factor Production Maturation																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Quick Reaction Capability (QRC) Prototyping	2	2019	4	2021
QRC Testing and Analyses	2	2021	1	2022
QRC Production & Equipping	3	2021	2	2023
Capability Development Document (CDD)	2	2022	2	2022
Program of Record (POR) Engineering Development for Production	1	2022	2	2023
Developmental Test (POR)	4	2022	1	2023
Limited User Test (LUT)	4	2022	1	2023
Milestone C Production Decision	2	2023	2	2023
Low Rate Initial Production (LRIP)	3	2023	3	2024
Production Qualification Test (PQT)Initial Operational Test & Evaluation (IOT&E)	4	2023	1	2024
Full Rate Production (FRP) Decision	2	2024	2	2024
Initial Operational Capability (IOC)	4	2024	4	2024
Production & Fielding	4	2024	4	2028
DAPS Modular Open System Approach (MOSA) Form Factor Prototype Development	3	2024	2	2025
DAPS MOSA Form Factor Production Maturation	3	2025	1	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ2 / MOUNTED
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
EJ2: MOUNTED	-	56.764	34.668	15.728	-	15.728	14.130	22.937	7.716	6.972	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Mounted Assured Positioning, Navigation and Timing System (MAPS) meets congressional (10 USC 2281) and Department of Defense guidance to provide resilient, survivable, M-Code Global Positioning System (GPS) capable Ground User Equipment (MGUE) receivers. The MAPS will deliver systems that provide the Army's combat forces access to assured PNT information under conditions where space-based GPS may be limited or denied to enable Army forces the ability to move, shoot, communicate, and provide situational awareness. MAPS addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fire and Command and Control systems that are dependent on accurate Position and Timing. The MAPS will provide PNT when GPS is degraded or denied through military code (M-code) GPS, Alternative Navigation (ALTNV) signals, timing, sensor fusion, anti-jam antenna, and beam steering. This capability will deliver distributed assured PNT capabilities to Armored Stryker and Infantry Brigade Combat Team platforms in an iterative and affordable manner that allows for future modernization.

Fiscal Year (FY) 2023 Base dollars in the amount of \$15.728 Million support MAPS system engineering and management support, production qualification and Initial Operational Test and Evaluation in preparation for Full Rate Production.

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

	FY 2021	FY 2022	FY 2023
Title: Mounted APNT System (MAPS)	56.764	33.398	15.728
Description: Funding supports MAPS hardware and software development, systems engineering, platform and client system integration, development and operational testing, and program management efforts.			
FY 2022 Plans: FY 2022 Base dollars in the amount of \$33.398 Million supports software integration, client system and platform integration and testing efforts supporting 35 platform variants, completion of production maturation and program management activities. Milestone C is scheduled for 3Q FY 2022.			
FY 2023 Plans: Fiscal Year (FY) 2023 Base dollars in the amount of \$15.728 Million support MAPS system engineering and management support, production qualification and Initial Operational Test and Evaluation in preparation for Full Rate Production Decision 2Q FY2024. Complete final RDT&E integration efforts.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Funding decreased from \$33.398 Million in FY 2022 to \$15.728 Million in FY 2023. This decrease is due to completion of product manufacturing readiness and transition of platform integration to OPA.			
Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)	-	1.270	-
Description: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR).			
FY 2022 Plans: FY 2022 Base dollars in the amount of \$1.270 Million will support Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) reduction.			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased from \$1.270 Million in FY 2022 to \$0.000 Million in FY 2023. This decrease is due to Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) reduction.			
Accomplishments/Planned Programs Subtotals	56.764	34.668	15.728

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

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• K49030: <i>Mounted Hub A-PNT</i>	86.610	80.658	156.015	-	156.015	182.146	128.501	132.689	132.614	Continuing	Continuing
• BV4: <i>Area Protection and Alt Nav Technology Development</i>	18.152	16.402	17.617	-	17.617	-	-	-	-	0.000	52.171

Remarks
 K49030 / Mounted Hub APNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.
 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the MAPS.

D. Acquisition Strategy
 The Mounted Assured Positioning, Navigation and Timing System (MAPS) acquisition strategy consists of an iterative development operations methodology for the development, testing, production and fielding of a material solution that implements Congressional guidance for M-Code capability (10 USC 2281), modular open systems approach (Reference House Report 116-442, 2020), and the MAPS Capability Development Document (approved 12 September 2020) performance requirements. The MAPS strategy leveraged competitive Other Transaction Authority (OTA) agreements to assess industry capabilities, develop prototypes, and mature technology upgrades. Developmental test and operational assessment results informed a best value decision in September 2020 of the selected material solution for final engineering development, production and manufacturing readiness, and Limited User Test (LUT). LUT results will inform a major capabilities acquisition program Milestone C decision in 3Q FY 2022. A follow-on hybrid fixed priced indefinite duration indefinite quantity FAR production contract will be awarded providing production

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 4	PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	EJ2 / <i>MOUNTED</i>

test articles for Initial Operational Test and Evaluation (IOT&E) in FY 2023 and demonstrate production ramp-up. The IOT&E supports fielding to Armored, Stryker Brigade Combat Teams (BCTs) and the full rate production decision in 2Q FY 2024. FY 2024 follow on test and evaluation will demonstrate capability for remaining key leader and key combat platforms.

The Mounted Assured Positioning, Navigation and Timing System (MAPS) Modular Open System Approach (MOSA) is a follow on iteration of MAPS and provides an Assured PNT solution with M-Code GPS and Anti-Jam Antenna for use in a common platform chassis to reduce non-recurring engineering costs. Maturation, integration and testing of the MAPS MOSA will be initiated in FY 2025 followed by an Operational Assessment (OA).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ2 / MOUNTED
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Support	C/CPFF	Various : Various	-	1.812	Nov 2020	1.039	Nov 2021	0.890	Jan 2023	-		0.890	Continuing	Continuing	Continuing
FY 2022 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.270	Mar 2022	-		-		-	0.000	1.270	-
Subtotal			-	1.812		2.309		0.890		-		0.890	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Manufacturing Readiness (Product Maturation) Contract	C/FFP	Collins Aerospace : APG, MD	-	21.195	Nov 2020	1.407	Nov 2021	-		-		-	0.000	22.602	-
Mounted PNT Integration - Combat Platforms	C/CPFF	Various : Various	-	19.544	Mar 2021	12.782	Mar 2022	3.655	Dec 2022	-		3.655	0.000	35.981	-
Mounted PNT Integration - Combat Support Platforms	C/CPFF	Various : Various	-	0.407	Nov 2020	4.207	Jan 2022	0.175	Feb 2023	-		0.175	0.000	4.789	-
Mounted PNT Integration - Combat Services Support Platforms	Various	Various : Various	-	-		2.179	Feb 2022	-		-		-	0.000	2.179	-
Client Software Integration (Various)	MIPR	AvMC / S3I : Huntsville, AL	-	0.805	Feb 2021	0.400	Apr 2022	0.805	Feb 2023	-		0.805	0.000	2.010	-
Subtotal			-	41.951		20.975		4.635		-		4.635	0.000	67.561	N/A

Remarks
 FY2023 Client and Software Integration supports software integration for Victory and Mounted Mission Command.

 FY2023 Mounted PNT Integration completes all platforms initiated with RDTE in prior years (incrementally funded). The remaining platform and client integration will be funded by OPA.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ2 / MOUNTED
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Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Technical Services - Government	Various	C5ISR : Various	-	0.979	Oct 2020	1.800	Nov 2021	0.514	Nov 2022	-		0.514	Continuing	Continuing	Continuing
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	4.913	Nov 2020	5.608	Jan 2022	1.934	Jan 2023	-		1.934	Continuing	Continuing	Continuing
Subtotal			-	5.892		7.408		2.448		-		2.448	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Field Testing / Development Test	MIPR	Various : TBD	-	7.109	Dec 2020	3.976	Jan 2022	-		-		-	0.000	11.085	-
Production Qualification Test & Initial Operational Test & Evaluation (IOT&E)	TBD	Various : TBD	-	-		-		7.755	Dec 2022	-		7.755	0.000	7.755	-
Subtotal			-	7.109		3.976		7.755		-		7.755	0.000	18.840	N/A

Remarks
FY2023 Production Qualification Test & Initial Operational Test & Evaluation (IOT&E) testing validates performance against the MAPS Capability Development Document approved 12 September 2020.

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	56.764	34.668	15.728	-	15.728	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / MOUNTED

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
Client and Platform Integration (RDT&E)																																				
Client and Platform Integration (OPA)																																				
Production Maturation - Phase 3																																				
Development Test																																				
Limited User Test																																				
Milestone C Low Rate Initial Production (LRIP) Decision				LUT	1																															
Production Contract Award				2																																
LRIP / Full Rate Production (FRP) and Fielding																																				
Production Qualification Test & Initial Operational Test & Evaluation																																				
Full Rate Production Decision				3																																
Follow on Test and Evaluation				FOTE																																
Initial Operational Capability				IOC																																
Modular Open System Approach - PNT & AJ Development and Test																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Client and Platform Integration (RDT&E)	3	2019	3	2023
Client and Platform Integration (OPA)	2	2022	4	2025
Mounted APNT Prototyping and Testing - Phase 1	1	2019	4	2019
Mounted APNT Prototyping and Testing - Phase 2	4	2019	4	2020
Operational Tech Demonstration	4	2020	4	2020
Direct Requirement Decision Selected Material Solution	4	2020	4	2020
Production Maturation - Phase 3	4	2020	3	2022
Development Test	3	2021	3	2022
Limited User Test	4	2021	4	2021
Milestone C Low Rate Initial Production (LRIP) Decision	3	2022	3	2022
Production Contract Award	3	2022	3	2022
LRIP / Full Rate Production (FRP) and Fielding	4	2022	1	2028
Production Qualification Test & Initial Operational Test & Evaluation	1	2023	4	2023
Full Rate Production Decision	2	2024	2	2024
Follow on Test and Evaluation	3	2024	3	2024
Initial Operational Capability	3	2024	3	2024
Modular Open System Approach - PNT & AJ Development and Test	1	2025	4	2027