Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604746A *I Automatic Test Equipment Development*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	10.104	10.915	5.578	-	5.578	4.051	4.131	3.616	3.616	Continuing	Continuing
L59: *Diagnost/Expert Sys*	-	4.795	6.369	4.032	-	4.032	0.000	0.000	0.000	0.000	0.000	15.196
L65: *Test Equipment Development*	-	5.309	4.546	1.546	-	1.546	4.051	4.131	3.616	3.616	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) provides for development and testing of general-purpose test equipment, state-of-the-art diagnostics and prognostics technologies, and software and systems to support the increasingly complex electronic components of the Army's new and upgraded weapon systems. It focuses on implementation of commercial test and diagnostic technologies across multiple weapon platforms to minimize the cost of troubleshooting and maintenance of Army equipment in the field. Funding supports modernization of the test equipment fleets by investigating technology insertions including, but not limited to, condition-based maintenance, instrument reduction/miniaturization, electro-optics (EO), radio frequency (RF), and other emerging technologies. Funding also supports development of initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and testing capabilities required for emerging weapons platforms.

Modular, reconfigurable automatic and semi-automatic systems are being developed under this program to satisfy weapon system test and diagnostics requirements. The Next Generation Automatic Test System (NGATS) provides state-of-the-art test and diagnostic capabilities to support current and future weapon systems. It is the platform for transitioning Agile Rapid Global Combat Support System (ARGCS) technologies into the Army weapon system support structure, and it will replace several aging automatic test systems (ATS) that are becoming prohibitively expensive to operate and maintain.

This PE also provides for continued development and improvement of general-purpose test equipment and calibration standards with emphasis on the incorporation of digital electronics and tailoring of configurations to improve deployability, mobility and survivability of the support equipment. It includes development, demonstration and testing of calibration standards and techniques to support new Army test equipment requirements; and, it provides for feasibility studies, market research, inventory analyses, bid sample testing and prototyping to support acquisition of calibration systems and general-purpose test and diagnostics equipment.

FY 2021 Base funding for this PE continues incremental development of the Army's standard NGATS which will improve deployability and mobility of test and diagnostic equipment. The NGATS provides state-of-the-art test and diagnostic capabilities and a means for reducing the Army's test equipment operating and support costs and the costs for supporting a number of the Army's vital warfighting systems. The FY 2021 funding will develop or significantly modify test equipment to satisfy modular force and homeland security support requirements that cannot be accommodated with test equipment currently available in the commercial marketplace such as RF and EO testing capability. It will also provide for technology insertions to modernize the Army's standard at-system tester to meet test and diagnostic requirements of the supported weapon systems, develop/redesign test program sets and hardware for support of legacy and emerging weapon systems, develop a network centric software framework for NGATS, and develop and test general-purpose test equipment and calibration standards to meet Army weapon system support requirements.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army					Date: February 2020
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 5: *System Development & Demonstration (SDD)*			R-1 Program Element (Number/Name) PE 0604746A / *Automatic Test Equipment Development*		
B. Program Change Summary ($ in Millions)	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**
Previous President's Budget	11.782	10.915	9.880	-	9.880
Current President's Budget	10.104	10.915	5.578	-	5.578
Total Adjustments	-1.678	0.000	-4.302	-	-4.302
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.678	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-4.302	-	-4.302

Change Summary Explanation

FY 2019 - Reprogramming of $1.678 million to cover urgent unresourced requirement.

FY 2021 - Reduction of $4.302 million to accommodate a higher priority requirement.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604746A / *Automatic Test Equipment Development*	Project (Number/Name) L59 / *Diagnost/Expert Sys*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
L59: *Diagnost/Expert Sys*	-	4.795	6.369	4.032	-	4.032	0.000	0.000	0.000	0.000	0.000	15.196
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds development of and system enhancements for the Next Generation Automatic Test System (NGATS) and the Maintenance Support Device (MSD). The NGATS is a general-purpose automatic test system (ATS) that provides test and diagnostic capabilities required to support current and future weapons and combat support systems and will facilitate retirement of aging and obsolete test equipment that is imposing increasing logistics and operations and support cost burdens. It is the platform for transitioning Agile Rapid Global Combat Support System (ARGCS) Advanced Concept Technology Demonstration (ACTD) technologies into the Army weapon system support structure. The ARGCS ACTD initiative was sponsored by the Department of Defense, and all Services are expected to transition demonstrated technologies into their ATS programs. The MSD is the Army's standard at-system tester and requires continuing technology insertions to support modernization of the supported weapon systems. This Project funds development efforts to insert the most current relevant technology into the next generation MSD, supports capability enhancement of wireless at-platform test set (WATS) connectivity, develops capabilities to minimize or eliminate Army dependency on expensive proprietary software to support tactical vehicles, and maintains compatibility with emerging platform hardware bus technology and software interface requirements. This Project also provides for continuing efforts in the development and testing of common procedures utilizing existing test program sets and software applications, and market surveys of commercially available test equipment, methods and procedures to determine applicability to Army requirements. The test and diagnostic systems and procedures developed under this Project are essential for ensuring the operational readiness, accuracy and effectiveness of the Army's warfighting systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Next Generation Automatic Test System (NGATS) Radio Frequency (RF) Test Capability	-	0.221	0.050
Description: Develop and integrate NGATS RF test capability			
FY 2020 Plans: Continue to develop RF software libraries to support communication, mapping and radar applications in fielded ground systems. Initiate redesign of RF interface to include new requirements and expanded mission capabilities. Evaluate and incorporate new state-of-the-art sources for more accurate measurements.			
FY 2021 Plans: Continue to develop RF software libraries to support communication, mapping and radar applications in fielded ground systems. Continue redesign of RF interface to include new requirements and expanded mission capabilities. Evaluate and incorporate new state-of-the-art sources for more accurate measurements.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Planned effort reduced because of loss of FY 2021 funding.			
Title: NGATS Increment 2 ***Description:*** Develop and test hardware and software for NGATS Increment 2 support capability ***FY 2020 Plans:*** Continue development and testing of state-of-the-art hardware and software for support of emerging required capabilities to support the Armored Brigade Combat Teams (ABCT). New ABCT requirements include high-speed digital, fiber channel, high-speed Ethernet and serial busses, and high power test (600V). Develop new software libraries to utilize instrument functions. Develop and implement dynamic switching capability. ***FY 2021 Plans:*** Continue development and testing of state-of-the-art hardware and software for support of emerging required capabilities to support the ABCTs. New ABCT requirements include high-speed digital, fiber channel, high-speed Ethernet and serial busses, and high power test (600V). Develop new software libraries to utilize instrument functions. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Planned effort reduced because of loss of FY 2021 funding.	0.050	0.371	0.200
Title: NGATS Electro-Optics (EO) Subsystem ***Description:*** Develop and test hardware and software for NGATS electro-optics (EO) subsystem (to include the capability to support new ground and aerial sensors for unmanned air and ground vehicles) ***FY 2020 Plans:*** Continue integration/testing of EO subsystem. ***FY 2021 Plans:*** Develop model production EO subsystem to achieve cost savings of production. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 increase is required to develop model production EO subsystem to achieve cost savings of production.	0.050	0.021	0.050
Title: Additional Software Capabilities for Use with NGATS ***Description:*** Develop software capabilities to incorporate common logistics operating environment/netcentric and embedded diagnostics data collection and analysis for closed loop diagnostic maintenance in support of condition-based maintenance ***FY 2020 Plans:***	0.386	0.171	0.200

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Continue development of new and emerging netcentric architecture. Continue development of software architecture that will define the transport protocol to interface to DoD common logistics environments and Logistics Modernization Program (LMP). Continue development and improvement of data packages to include health management information. Develop software to support condition-based maintenance (CBM)+. ***FY 2021 Plans:*** Develop software to enhance performance of health monitoring of NGATS system. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 funds required to enhance performance of health monitoring of NGATS system.			
Title: NGATS Performance Enhancement ***Description:*** NGATS core instrument/software modifications to increase NGATS performance ***FY 2020 Plans:*** Continue obsolescence identification and mitigation; continue analysis of system reliability and performance; identify bad actors and propose and integrate upgrades to increase readiness. Analyze new requirements from emerging weapons systems and implement system upgrades through hardware and software to meet platform testing requirements. Evaluate Peripheral Component Interconnect (PCI) Extensions for Instrumentation (PXI) technology incorporation to increase performance and reduce station life cycle cost. Develop programmable ethernet technology. Develop high speed 1553 bus technology to support line replaceable units. ***FY 2021 Plans:*** Develop and test NGATS shelter modification to allow addition of electro-optics and radio frequency subsystems. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 effort in this area is less costly than previous initiatives.	0.250	0.621	0.250
Title: Abrams/Bradley Test Program Set (TPS) Design ***Description:*** Design, test and evaluate Abrams/Bradley TPSs to utilize modern core NGATS instrumentation vice continuing to execute on single-purpose instrumentation specifically developed to emulate Abrams/Bradley legacy test equipment (i.e., Direct Support Electrical System Test Set (DSESTS)) ***FY 2020 Plans:***	1.926	2.372	1.300

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Continue redesign of Abrams/Bradley TPSs to execute on core commercial NGATS instrumentation versus continuing to execute on single-purpose instrumentation specifically developed for testing Abrams/Bradley line replaceable units (LRU). Redesign interconnect devices (ICD) to incorporate printed circuit boards and ribbon cables to reduce cost and maintenance. ***FY 2021 Plans:*** Continue redesign of Abrams/Bradley TPSs to execute on core commercial NGATS instrumentation versus continuing to execute on single-purpose instrumentation specifically developed for testing Abrams/Bradley LRUs. Continue redesign of ICDs to incorporate printed circuit boards and ribbon cables to reduce cost and maintenance. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Level of effort required for Abrams/Bradley TPS redesign has decreased for FY 2021.			
Title: Electro-Optic (EO) TPS Development ***Description:*** Develop Increment 2 and 3 EO TPSs for use with NGATS EO asset to utilize (Army standard) core NGATS instrumentation vice legacy automatic test systems such as DSESTS and Base Shop Test Facility (BSTF)(V)5 ***FY 2020 Plans:*** Develop and rehost EO TPSs in support of the Armored Brigade Combat Teams (ABCT) to include Common Remotely Operated Weapons Station (CROWS) low profile in improved gunners primary site, laser range finding and forward looking infrared (FLIR). ***FY 2021 Plans:*** Continue development and rehost of EO TPSs in support of the ABCT to include CROWS low profile in improved gunners primary site, laser range finding and FLIR. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Planned effort reduced because of loss of FY 2021 funding.	-	0.271	0.100
Title: NGATS Logistics Support Products ***Description:*** Develop NGATS initial logistics support products (including provisioning, technical manuals and calibration) ***FY 2020 Plans:*** Continue development of NGATS EO and RF logistics products for use with the full-rate production NGATS. ***FY 2021 Plans:*** Develop updates to technical manuals and technical bulletins to support organic calibration of NGATS. ***FY 2020 to FY 2021 Increase/Decrease Statement:***	1.250	1.221	0.636

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Part of the effort previously planned for FY 2021 was funded in FY 2020 because of accelerated requirement for update of technical manuals and bulletins.			
Title: Maintenance Support Device (MSD) Technology Enhancements ***Description:*** Modernizes the current MSD fleet by investigating and Incorporating relevant technology into the next-generation MSD and supporting capability enhancement of the wireless at-platform test set (WATS). Develops capabilities to minimize or eliminate Army dependency on proprietary software to support tactical vehicles and maintain compatibility with emerging platform hardware bus technology and software interface requirements. ***FY 2020 Plans:*** Initiate next generation MSD market research. Incorporate greater range of supported weapons system diagnostic code fault detection into diagnostic software to support tactical vehicle sustainment concepts and ensure data bus compatibility and readability. Investigate emerging interactive electronic technical manual (IETM) viewer environments for use with future generation MSD. ***FY 2021 Plans:*** Complete next-generation MSD market research. Incorporate greater range of supported weapons system diagnostic code fault detection into diagnostic software to support tactical vehicle sustainment concepts and ensure data bus compatibility and readability. Develop software to complete transition to the Army's emerging single IETM viewer/authoring environment for use with future generation MSD and diagnostic software. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 funds required to develop software to complete transition to the Army's emerging single IETM viewer/authoring environment.	0.633	0.604	0.633
Title: NGATS Simulation Environment ***Description:*** Develop a simulation environment that will allow development and testing of TPSs on a desktop environment ***FY 2021 Plans:*** Develop an NGATS simulation environment to allow TPS developers and contractors to develop and test TPSs on a desktop environment. Environment will allow for a cost-effective way to develop, maintain and troubleshoot TPSs off station. Develop desktop training environment for TPS developers and maintainers. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Effort planned for FY 2020 was delayed until FY 2021 because of higher priority requirements.	-	-	0.163
Title: TPS Development Environment	-	-	0.250

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Description: Develop a standardized TPS development environment for NGATS ***FY 2021 Plans:*** Develop the C-Oriented Test Executive (COTE) TPS development software for NGATS. Develop test executive that is standard and compliant with DoD initiatives, framework working group and the Automatic Test Equipment Management Board (AMB). Standardized test executive will promote long-term maintainability of TPSs. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Effort planned for FY 2020 was delayed until FY 2021 because of higher priority requirements..			
Title: Anti-Tamper/Cyber Security ***Description:*** Develop an Anti-Tamper/Cyber Security (AT/CS) software capability for NGATS ***FY 2020 Plans:*** Continue development of AT/CS software capability for NGATS. Continue to upgrade existing hardware and software with constantly changing security and information assurance requirements. ***FY 2021 Plans:*** Develop and perform anti-tamper documentation and testing. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Effort previously planned for FY 2021 funded in FY 2020 to complete this action as scheduled.	0.250	0.207	0.200
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.289	-
Accomplishments/Planned Programs Subtotals	4.795	6.369	4.032

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• MB4000: *Integrated Family Of Test Equipment (IFTE)*	82.037	78.375	78.578	-	78.578	78.146	-	-	-	0.000	317.136

Remarks

D. Acquisition Strategy

This developmental Project consists of organic and contractual actions. When the necessary expertise and capability are available within the Department of Defense, services required for the individual development projects are ordered from the government source; otherwise, commercial contracts are used. Equipment required for developmental projects is obtained by contract from the commercial supplier. Developmental efforts for the Next Generation Automatic Test System (NGATS) are being completed under a number of contracts awarded to the prime contractor for the Integrated Family of Test Equipment off-platform testers and other contractors with automatic test equipment (ATE) and test program set development capabilities. NGATS is following an evolutionary acquisition strategy using incremental development to satisfy Army depot and field testing requirements for new and existing systems. It will replace existing legacy Army ATE (i.e., Base Shop Test Facility (BSTF)(V)3, BSTF(V)5, and Direct Support Electrical System Test Set) as well as Army depot system-specific ATE.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604746A / *Automatic Test Equipment Development*	Project (Number/Name) L59 / *Diagnost/Expert Sys*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Management	Various	Various : Various	0.596	0.253	Jan 2019	-		-		-		-	0.000	0.849	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.289		-		-		-	0.000	0.289	-
		Subtotal	0.596	0.253		0.289		-		-		-	0.000	1.138	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development/ Verification/Validation	Various	Various, : Various	40.398	1.019	Feb 2019	3.347	Feb 2020	1.715	Feb 2021	-		1.715	0.000	46.479	-
Hardware/Support Items Development	Various	Various, : Various	71.458	1.573	Jan 2019	2.247	Jan 2020	1.917	Jan 2021	-		1.917	0.000	77.195	-
		Subtotal	111.856	2.592		5.594		3.632		-		3.632	0.000	123.674	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technical Support	Various	Various, : Various	51.025	0.450	Jan 2019	0.388	Jan 2020	0.300	Dec 2020	-		0.300	0.000	52.163	-
Other Direct	Various	Various, : Various	4.630	1.500	Jan 2019	0.098	Jan 2020	0.100	Dec 2020	-		0.100	0.000	6.328	-
		Subtotal	55.655	1.950		0.486		0.400		-		0.400	0.000	58.491	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental/ Operational Testing	Various	Various, : Various	3.096	-		-		-		-		-	0.000	3.096	-
		Subtotal	3.096	-		-		-		-		-	0.000	3.096	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Test program set (TPS) and contractor developmental test and evaluation are included in the product development cost.

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	171.203	4.795		6.369		4.032		-		4.032	0.000	186.399	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

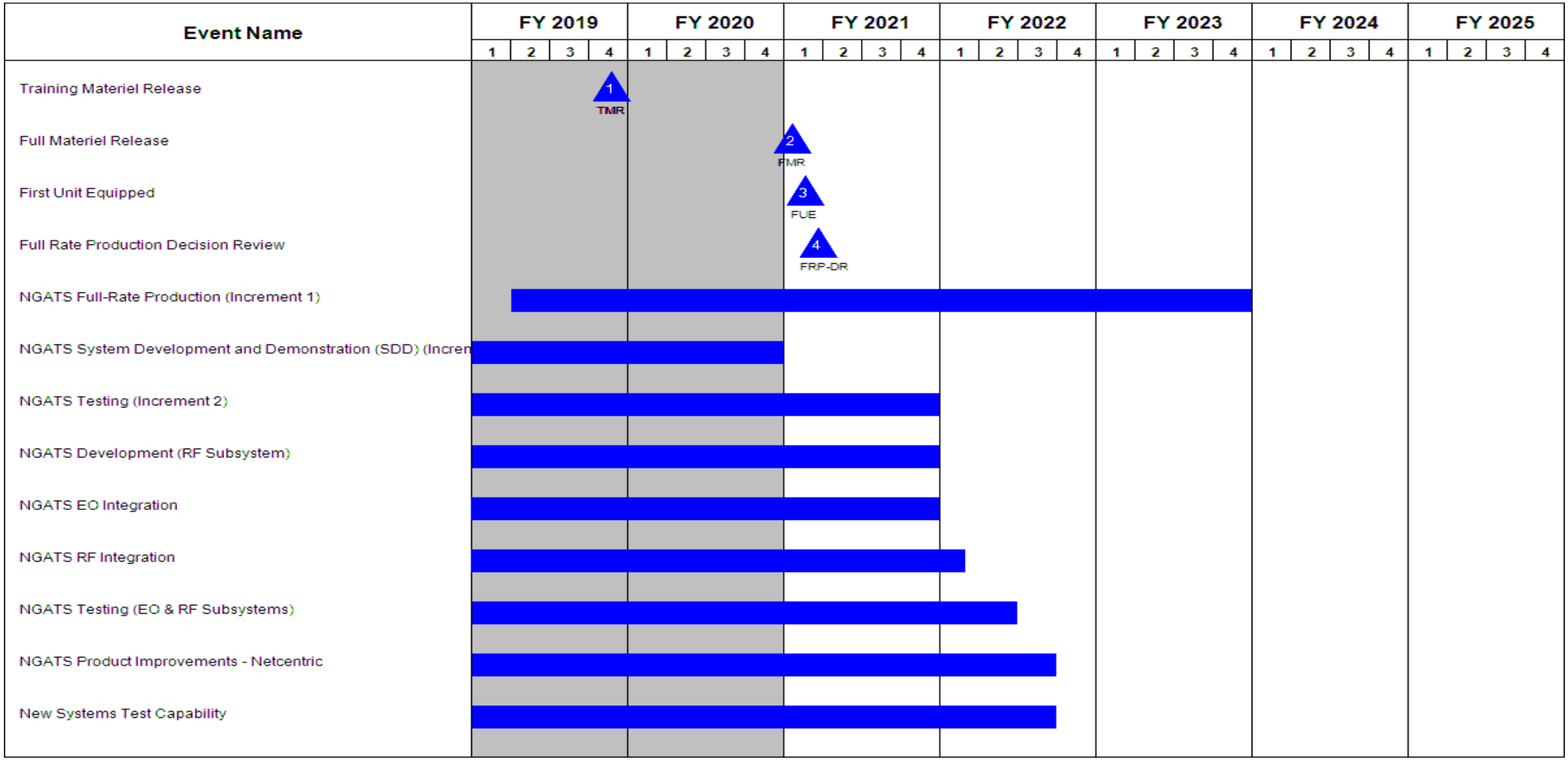

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

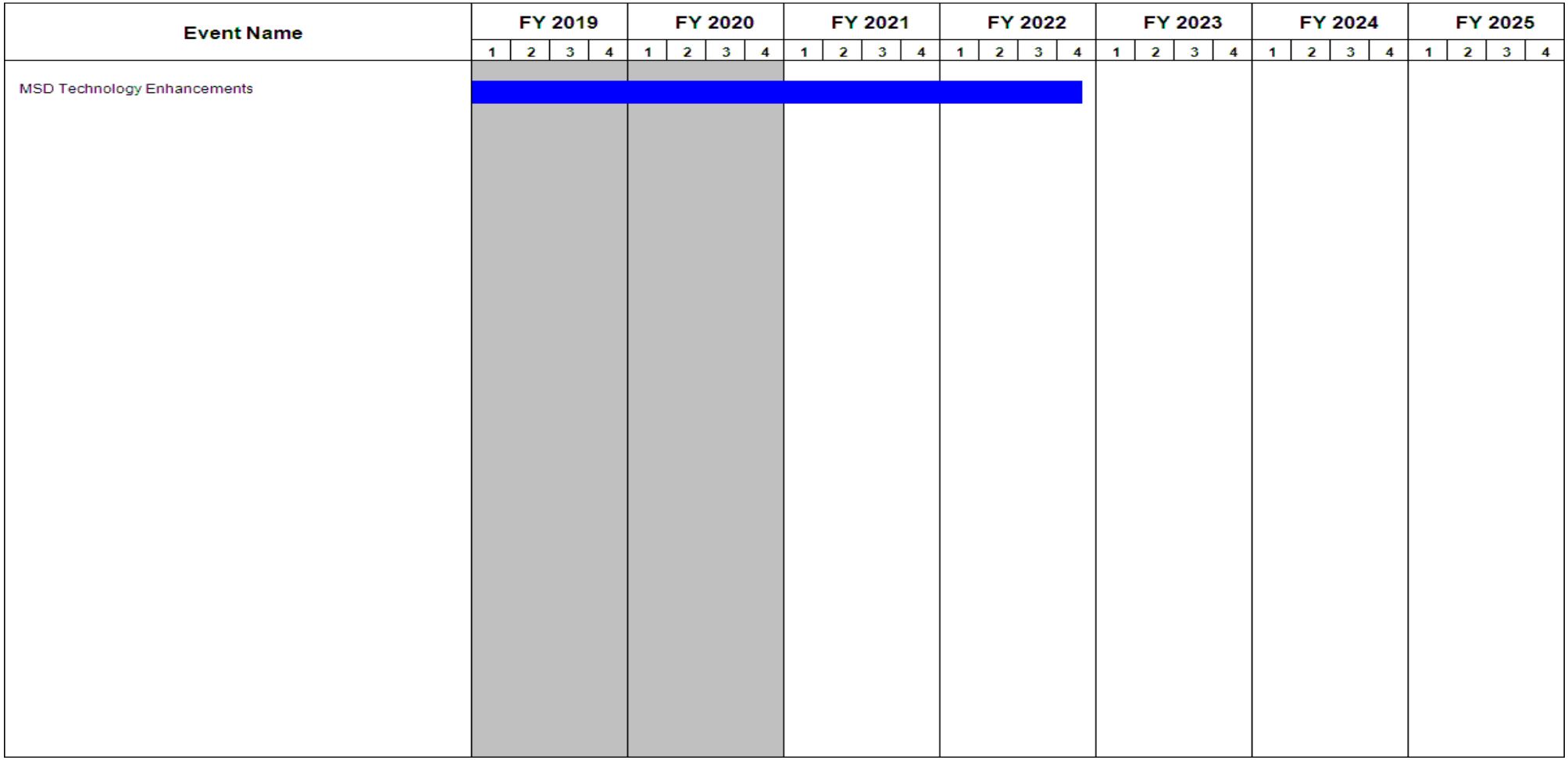

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L59 / *Diagnost/Expert Sys*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
NGATS Testing (Increment 1)	1	2011	1	2012
Production for First Article	1	2015	2	2017
Training Materiel Release	4	2019	4	2019
Full Materiel Release	1	2021	1	2021
First Unit Equipped	1	2021	1	2021
Full Rate Production Decision Review	1	2021	1	2021
NGATS Testing (Increment 1 Follow-On DT/OT)	1	2016	3	2016
NGATS Full-Rate Production (Increment 1)	2	2019	4	2023
NGATS System Development and Demonstration (SDD) (Increment 2)	1	2016	4	2020
NGATS Testing (Increment 2)	1	2016	4	2021
FOT&E Completed (DT)	3	2018	3	2018
NGATS Development (EO Subsystem)	4	2010	4	2015
NGATS Development (RF Subsystem)	1	2016	4	2021
NGATS EO Integration	3	2016	4	2021
NGATS RF Integration	3	2017	1	2022
NGATS Testing (EO & RF Subsystems)	1	2016	2	2022
NGATS Product Improvements - Netcentric	1	2016	3	2022
New Systems Test Capability	1	2016	3	2022
MSD Technology Enhancements	1	2016	4	2022

Note

Test program set (TPS) compatibility testing runs continually throughout the product development process.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604746A / *Automatic Test Equipment Development*	Project (Number/Name) L65 / *Test Equipment Development*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
L65: *Test Equipment Development*	-	5.309	4.546	1.546	-	1.546	4.051	4.131	3.616	3.616	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project supports modernization of calibration instruments, techniques, and existing Army calibration systems by investigating technology insertions including automated and autonomous operations and other emerging technologies. Funding also supports development of initial prototypes to enable refinement of Operational Requirements and early user feedback to support future calibration systems and general-purpose test, measurement and diagnostic equipment (TMDE) acquisitions. This Project develops calibration software and calibration capability for electro-optical, chemical, biological agent, radiation sourcing and detection systems, signal measurement from direct current to microwave ranges, physical and mechanical measurements such as torque, pressure, and temperature, and improvements in test and measurement performance envelopes. It provides for product improvements and development/evaluation of advanced technologies to increase reliability of calibration systems and general-purpose TMDE. The product improvements eliminate gaps in existing organic capabilities and ensure operational readiness and safety of Army weapons and combat support systems. These improvements employ reconfigurable open-electronics architecture and computer-based instrumentation where feasible and focus on reduced test equipment footprints to improve deployability and mobility in areas of operation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Calibration Sets (CALSETS) Software Environment and Calibration Procedures	1.032	0.250	0.463
Description: Develop and test Version 3.0 of an Army automated calibration environment and develop calibration procedures. Test and evaluate automated calibration equipment software efforts in support of the Army risk management framework (RMF). ***FY 2020 Plans:*** Develop Army calibration enterprise data collection and analysis for obsolescence planning gaps and TMDE readiness. ***FY 2021 Plans:*** Test and evaluate Army calibration enterprise data collection and benchmark leading indicators for obsolescence planning gaps and TMDE readiness. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Software development, test and evaluation costs increase due to additional resources needed to develop and test a large number of calibration procedures.			
Title: Physical Instruments	1.676	0.724	0.414

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L65 / *Test Equipment Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Description: Research, develop, and test physical parameter calibration instrumentation to support areas such as force, torque, radiological, chemical/biological agent detection systems, night vision testers, small arms gages, pneumatic pressure systems, and temperature related to target detection in the infrared spectrum. ***FY 2020 Plans:*** Perform air speed correlation study; develop infrared emissivity corrections for infrared systems calibration; develop radiation sources for NexGen radiation detector calibration; test and evaluate high torque multipliers for ground and aviation platforms. ***FY 2021 Plans:*** Test infrared emissivity corrections for infrared systems calibration; develop neutron radiation sources for NexGen radiation detector calibration; test and evaluate Army's flow transfer system. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Level of effort planned for FY 2021 reduced because of loss of funding.			
Title: Electrical Instruments ***Description:*** Research, develop, and test electrical parameter calibration instrumentation to support areas such as intrinsic electrical standards, electrical transport standards and electro-optic standards. ***FY 2020 Plans:*** Develop precision direct current (DC) volt standards; develop test equipment for 5G communications networks; test and evaluate TMDE prototypes for ultraviolent irradiance, high energy laser and fiber-optic networks. ***FY 2021 Plans:*** Test precision DC volt standards; test and evaluate TMDE prototypes for ultraviolent irradiance and fiber-optic source stabilization. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Level of effort planned for FY 2021 reduced because of loss of funding.	0.679	0.994	0.284
Title: Test Equipment Modernization (TEMOD) ***Description:*** Perform market research, bid sample testing and evaluation of commercial general-purpose electronic test equipment (GPETE), and develop performance specifications for TEMOD acquisitions. ***FY 2020 Plans:***	1.922	2.372	0.385

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L65 / *Test Equipment Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Perform market research and evaluation of commercial GPETE and validate performance specifications for improved test equipment. The market research will be expanded to cover emerging synthetic instrumentation to potentially replace multiple pieces of GPETE within one platform. Conduct bid sample testing to support acquisition program. ***FY 2021 Plans:*** Perform market research and evaluation of commercial GPETE and validate performance specifications for improved test equipment. The market research will be expanded to cover emerging synthetic instrumentation to potentially replace multiple pieces of GPETE within one platform. Conduct bid sample testing to support acquisition program. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Progress on evaluation of six Other Transaction Authority (OTA) prototype TS-4549 Radio Test Sets will reduce funding requirement in FY 2021.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.206	-
Accomplishments/Planned Programs Subtotals	5.309	4.546	1.546

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• N10000: *Calibration Sets Equipment*	4.270	3.030	2.511	-	2.511	3.878	2.647	2.324	2.324	Continuing	Continuing
• N11000: *Test Equipment Modernization (TEMOD)*	9.316	13.415	14.941	-	14.941	17.398	14.459	13.697	13.691	Continuing	Continuing

Remarks

D. Acquisition Strategy

Projects focus on commercial and nondevelopmental item technologies. Department of Defense services provide programmatic, engineering expertise and capability for individual development projects; otherwise, commercial service contracts are used to obtain required capabilities. Equipment required for development projects

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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is obtained from commercial suppliers. Candidate commercial equipment and nondevelopmental items are identified and evaluated through market research and government test and evaluation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L65 / *Test Equipment Development*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
In-house Engineering	SS/ Various	Various : Various	6.505	0.162	Dec 2018	-		-		-		-	0.000	6.667	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.206		-		-		-	0.000	0.206	-
		Subtotal	6.505	0.162		0.206		-		-		-	0.000	6.873	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CALSETS Software Environment and Calibration	Various	Various : Various	7.126	0.548	Jan 2019	0.097	Feb 2020	0.215	Feb 2021	-		0.215	Continuing	Continuing	-
Physical Instruments	Various	Various : Various	8.182	0.934	Feb 2019	0.380	Feb 2020	0.185	Apr 2021	-		0.185	Continuing	Continuing	-
Electrical Instruments	Various	Various : Various	10.524	0.336	Feb 2019	0.541	Mar 2020	0.107	Feb 2021	-		0.107	Continuing	Continuing	-
Test Equipment Modernization	Various	Various : Various	1.102	1.154	Jan 2019	1.432	Feb 2020	0.231	Feb 2021	-		0.231	Continuing	Continuing	-
		Subtotal	26.934	2.972		2.450		0.738		-		0.738	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Engineering	C/FFP	Various : Various	2.638	0.195	Feb 2019	0.288	Feb 2020	0.319	Feb 2021	-		0.319	Continuing	Continuing	-
		Subtotal	2.638	0.195		0.288		0.319		-		0.319	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604746A / *Automatic Test Equipment Development*	Project (Number/Name) L65 / *Test Equipment Development*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CALSETS Software Environment and Calibration	Various	Various : Various	1.603	0.365	Apr 2019	0.056	Feb 2020	0.143	Feb 2021	-		0.143	Continuing	Continuing	-
Physical Instruments	Various	Various : Various	2.736	0.622	Mar 2019	0.246	Feb 2020	0.121	Apr 2021	-		0.121	Continuing	Continuing	-
Electrical Instruments	Various	Various : Various	2.485	0.224	Mar 2019	0.354	Mar 2020	0.071	Feb 2021	-		0.071	Continuing	Continuing	-
Test Equipment Modernization	Various	Various : Various	0.967	0.769	Feb 2019	0.946	Feb 2020	0.154	Feb 2021	-		0.154	Continuing	Continuing	-
		Subtotal	7.791	1.980		1.602		0.489		-		0.489	Continuing	Continuing	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	43.868	5.309		4.546		1.546		-		1.546	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L65 / *Test Equipment Development*

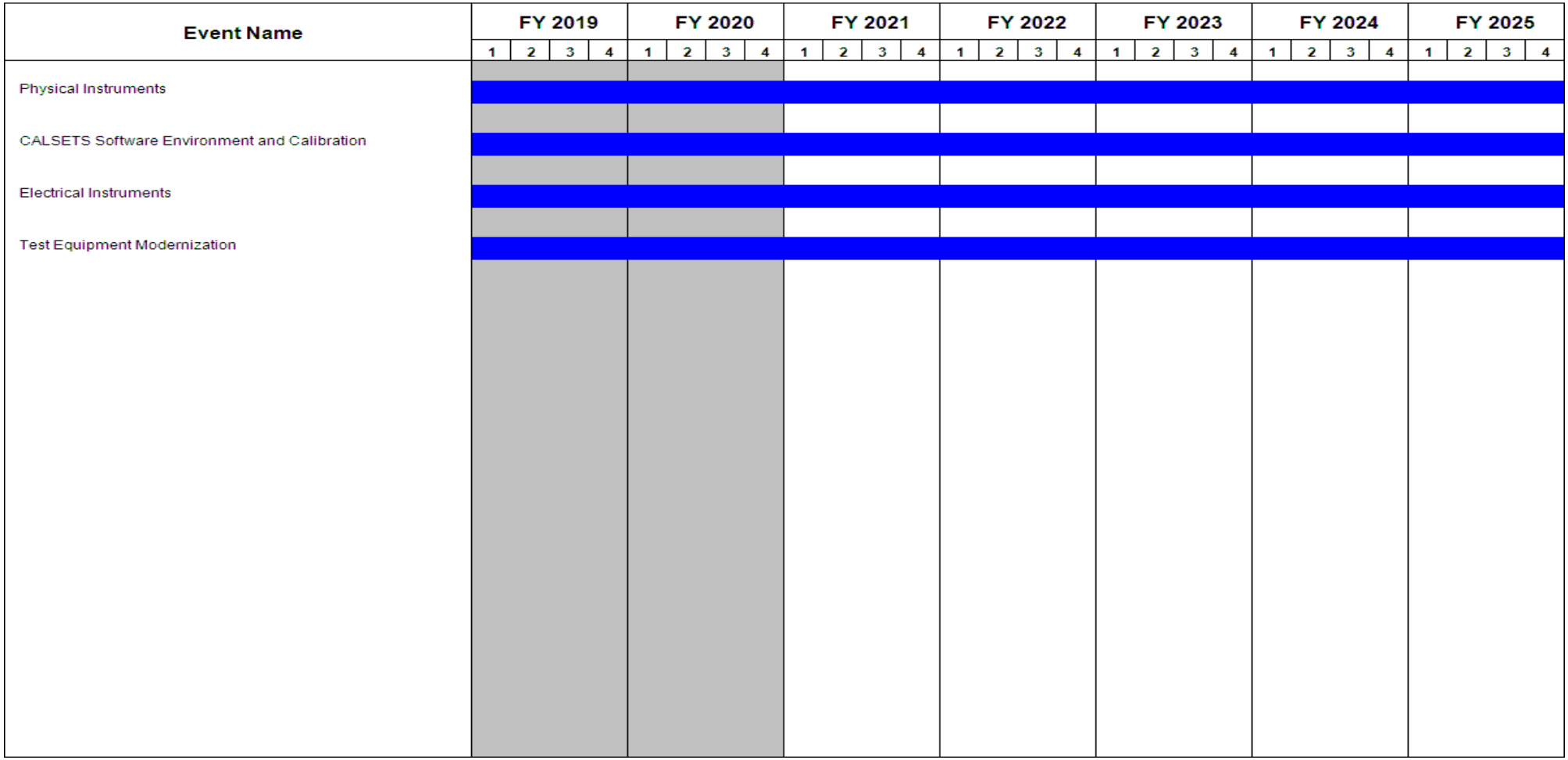

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604746A / *Automatic Test Equipment Development*	**Project (Number/Name)** L65 / *Test Equipment Development*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
AN/GSM-421(V2) User Testing	2	2007	4	2012
Physical Instruments	1	2016	4	2025
CALSETS Software Environment and Calibration	1	2016	4	2025
Electrical Instruments	1	2016	4	2025
Test Equipment Modernization	1	2016	4	2025