Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0206624M *I Marine Corps Cmbt Services Supt*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	227.933	23.423	13.194	25.258	-	25.258	26.561	37.818	14.106	14.384	Continuing	Continuing
0201: *Logistical Veh Sys Replacement (LVSR)*	36.878	0.565	0.264	0.236	-	0.236	0.211	0.213	0.218	0.222	Continuing	Continuing
2316: *Combat Service Support Eng Equip*	72.605	8.861	4.984	18.298	-	18.298	18.310	31.556	7.711	7.864	Continuing	Continuing
2509: *Motor Transport Mod*	43.577	1.227	1.578	1.213	-	1.213	1.222	1.251	1.279	1.304	Continuing	Continuing
2510: *MAGTF CSSE & SE*	20.787	8.414	5.090	3.877	-	3.877	4.906	4.027	4.112	4.193	Continuing	Continuing
2929: *Testing Measuring Diag Equip & SE*	8.851	0.785	0.538	0.577	-	0.577	0.617	0.632	0.645	0.657	Continuing	Continuing
9C90: *MTVR Mod*	45.235	3.571	0.740	1.057	-	1.057	1.295	0.139	0.141	0.144	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) provides funding for Marine Air-Ground Task Force requirements for Combat Service Support equipment improvement. It will enhance combat breaching capabilities of the ground combat elements, logistics, maintenance and transportation. The PE also provides improvements in all areas of Combat Service Support Equipment Vehicles by determining the replacement for the light fleet of vehicles. This includes projects such as: Alternative Power Sources for Communications Equipment (APSCE) which is a suite of devices that provide the commander with the capability to use existing power to operate his communication equipment, computers and peripheral equipment instead of using batteries or fossil fuel generators; the Marine Corps Family of Automatic Test Systems (ATS), formerly TETS, which provides automatic testing capability for use by technicians both in garrison and forward edge of the battlefield; improvements in all areas of the M1A1 main battle tank, LVSR & MTVR; the High Performance Capabilities for Military Vehicles Project which is dedicated to applying the best practices of the motor sports industry to military vehicles including engineering expertise, equipment and technology.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0206624M *I Marine Corps Cmbt Services Supt*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	19.955	13.194	15.118	-	15.118
Current President's Budget	23.423	13.194	25.258	-	25.258
Total Adjustments	3.468	0.000	10.140	-	10.140
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	3.904	0.000			
• SBIR/STTR Transfer	-0.435	0.000			
• Program Adjustments	0.000	0.000	10.000	-	10.000
• Rate/Misc Adjustments	-0.001	0.000	0.140	-	0.140

Change Summary Explanation

The $12.064M increase from FY17 to FY18 can be attributed to M1A1 Modifications for the Active Protection System (APS) Technology Demonstrator design in order to make the system operationally suitable for the Marine Corps.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 0201 / *Logistical Veh Sys Replacement (LVSR)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0201: *Logistical Veh Sys Replacement (LVSR)*	36.878	0.565	0.264	0.236	-	0.236	0.211	0.213	0.218	0.222	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Logistics Vehicle System Replacement (LVSR) is the USMC Marine Air-Ground Task Force (MAGTF) Heavy Lift Capability system. The Medium/Heavy Modification line funds numerous modifications and initiatives that are required to address operational priorities, engineering change proposals, safety concerns, support equipment inefficiencies, product quality deficiencies, and other issues that effect vehicle reliability, availability, maintainability and readiness. A proactive and focused approach ensures proper vehicle sustainment and life cycle management, and it allows the flexibility to develop and implement improvements as needed to respond to the evolving needs of the Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Product Development	0.435	0.132	0.236	0.000	0.236
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Completed Safety & Engineering Change Proposal (ECP) development required to meet the diverse environments of current and future operations of Marine Air Ground Task Force (MAGTF) Expeditionary Maneuver Warfare as continual changes in threat environment requires an on-going and proactive approach. - Began development of a solution to emergent brake corrosion issue and cab floor board for PMCS issue					
FY 2017 Plans: - Continue to support safety modification development and ECP development required to meet the diverse environments of current and future operations of MAGTF Expeditionary Maneuver Warfare as continual changes in threat environment requires an on-going and proactive approach. - Continue development of brake corrosion solution.					
FY 2018 Base Plans: - Continue to support safety modification development and ECP development required to meet the diverse environments of current and future operations of MAGTF Expeditionary Maneuver Warfare as continual changes in threat environment requires an on-going and proactive approach. - Complete development and provide solution to LVSR Brake ECP issues to LVSR fleet.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 0201 / *Logistical Veh Sys Replacement (LVSR)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Initiate development of armored door latch for vehicles to replace faulty latches (door closing mechanism), which are liable to break under impact. - Initiate development of Engineering Egress Lighting Solution. - Initiate root cause analysis for the armored cab bracket failure. ***FY 2018 OCO Plans:*** - N/A					
Title: Support ***Articles:*** ***FY 2016 Accomplishments:*** - Continued engineering change proposal and safety support required to meet the diverse environments of current and future operations of MAGTF Expeditionary Maneuver Warfare. Incorporating new safety upgrades that will protect the warfighter and LVSR vehicle from possible catastrophic events as warranted by continual changes in threat environment. ***FY 2017 Plans:*** - Complete engineering change proposal and safety support required to meet the diverse environments of current and future operations of MAGTF Expeditionary Maneuver Warfare as continual changes in threat environment requires an on-going and proactive approach. ***FY 2018 Base Plans:*** - N/A ***FY 2018 OCO Plans:*** - N/A	0.130 -	0.132 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.565	0.264	0.236	0.000	0.236

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/5230: *Motor Transport Modifications*	8.326	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/5050: *Logistics Vehicle System Replacement*	2.296	1.768	11.280	-	11.280	2.020	2.092	2.141	2.191	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 0201 / *Logistical Veh Sys Replacement (LVSR)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

Remarks

Motor Transport Modifications transferred from BLI 5230 to 5050 starting in FY17.
PMC LVSR portion of PMC BLI 5050 is associated with LVSR C0201

D. Acquisition Strategy

The Logistics Vehicle System Replacement (LVSR) program used a two-phase, single-step acquisition approach rather than an evolutionary acquisition approach. Phase I developed the Cargo variant and Phase II developed the Tractor and Wrecker variants. The program is currently in sustainment utilizing RDT&E funding to address required Engineering Change Proposals (ECPs) to maintain relevancy on the battlefield and implement system requirements.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*				Project (Number/Name) 2316 / *Combat Service Support Eng Equip*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
2316: *Combat Service Support Eng Equip*	72.605	8.861	4.984	18.298	-	18.298	18.310	31.556	7.711	7.864	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

M1A1 Mod Kit: The M1A1 Mod Kit effort includes improvements in all areas of the M1A1 main battle tank and the Armored Vehicle Launched Bridge (AVLB). The M1A1 tank provides armor-protected mobile firepower to the Marine Air Ground Task Force (MAGTF). Efforts under the mod line pertaining to the M1A1 include improvements such as: lethality systems, to increase armament accuracy and provide for off-board targeting improvement; survivability systems (including passive and active); communications and command and control; mobility; increasing the crew's situational awareness through sensor enhancements and intra-vehicular data sharing; and environmental testing of components. The AVLB provides the Marine Corps only armor-protected assault gap crossing capability. Continued funding is required to address obsolescence and address operational deficiencies to adapt the tank and AVLB to a changing operational environment and support user-defined product improvements. Funding also supports items such as miscellaneous tools and test items for the M1A1 tank and associated supporting platforms, safety and sustainment modifications to the bridge launcher, and Materiel Fielding Support.

The Engineer Mods and Tool Kits line funds modifications and initiatives which are required to address operational priorities, engineering change proposals, safety concerns, support equipment inefficiencies, product quality deficiencies and other issues that affect vehicle reliability, availability and readiness. This approach ensures proper vehicle sustainment and life cycle management in response to evolving needs of the Marine Corps fleet. Operational needs to provide personnel survivability on engineer equipment is essential to current and future operations. Research and development funding develops and integrates new lighter, compact armor technology and supports ballistic testing for applications to existing and future acquisitions.

Corrosion Prevention and Control (CPAC): The useful life of Marine Corps assets will be extended through a comprehensive CPAC RDT&E program aimed at identifying and certifying new corrosion control products, materials, processes and procedures for legacy and new acquisition. The CPAC RDT&E Program works to standardize and substantially improve strategies, objectives and processes to prevent, detect, and treat corrosion and its effects on Marine Corps ground vehicles and weapons systems. This mission responds to the Congressional directives and DoD and SECNAV instruction to reduce the negative operational effects and associated total ownership cost of Marine Corps ground vehicles and weapons systems.

The Mine Resistant Ambush Protected (MRAP) Family of Vehicles (FoV) provides tactical mobility for Warfighters with multi-mission vehicles designed to support urgent operational needs and protect personnel from the effects of improvised explosive devices (IEDs), underbody mines, and small arms fire threats. Multiple vehicle categories (CATs) have been procured, fielded, and sustained: MRAP All Terrain Vehicle (M-ATV) - Combat Operations (ops) in rural, mountainous, urban terrain. Category I - Urban combat operations, ambulance. Category II - Multi-mission ops-convoy lead, troop transport, ambulance, utility vehicle. Category III - Mine/ IED clearance ops, explosive ordnance disposal. Operational needs to provide personnel survivability is essential to current and future operations. Research and development funding develops and integrates support efforts such as ballistic glass or other safety issues, new armor technology and ballistic testing.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Engineer Mods and Tool Kits	0.436	0.479	0.616	0.000	0.616
Articles:	-	-	-	-	-
FY 2016 Accomplishments: -Continued to support work for Matting applications in support of the Engineer Family of Systems. -Completed project management design and integration efforts supporting Route Reconnaissance and Clearance (R2C) Capability Set Integration Kits. ***FY 2017 Plans:*** -Initiate new Engineer Change Proposals in support of Improved Ribbon Bridge development to fix corrosion pin issues. ***FY 2018 Base Plans:*** -Initiate testing of the Engineer Change Proposals in support of the Improved Ribbon Bridge. ***FY 2018 OCO Plans:*** N/A					
Title: M1A1 Modifications	5.329	1.319	14.228	0.000	14.228
Articles:	-	-	-	-	-
FY 2016 Accomplishments: -Completed the research and development effort for AIDATS and initiated other development efforts such as the Firepower Enhancement Program (FEP). -Initiated development efforts for the Active Protection System (APS) Technology Demonstrator to experiment and test the M1A1 with APS in order to capture Marine-unique operational, employment and platform specific challenges and requirements as well as MAGTF integration opportunities and challenges. This informed requirements, enabled lessons learned for future acquisition programs, and increased the Marine Corps' knowledge on APS. ***FY 2017 Plans:*** -Initiated obsolescence mitigation and upgrade development for the Firepower Enhancement Program (FEP) and upgrade the advanced Gunnery Primary Sight Lower Panel with the most current capabilities. - Program received $4.0M of additional funding in FY16 for APS, which accounts for the subsequent $4.0M decrease in FY17. Continue development efforts for the Active Protection System (APS) Technology Demonstrator. Efforts include design and mounting of an Installation Kit on the M1A1 to install the APS,					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
installation of the APS, Limited User Evaluation, physical characteristics assessments, stabilization, target tracking, and main gun fire testing, and live fire shots. ***FY 2018 Base Plans:*** -Continue supporting enhancements to FEP and initiate research and development of components for the Ammunition Data Link (ADL) Increment II in order to support the ability to utilize next generation munitions to their full capability across the M1A1 fleet. Support upgrades to the Advanced Gunnery Training System (AGTS), specifically incorporation of the AIDATS, Tank Commander's Single Handle (TCSH), and Slew to Cue (STC). Funding increase from FY17 to FY18 ($2.909M) supports the completion of prior development projects. - Funding increase in FY18 of $10.000M to conduct Non-Recurring Engineering (NRE) on the APS Technology Demonstrator design in order to make the system operationally suitable for the Marine Corps. The USMC will refine the Active Protection System (APS) Technology Demonstrator's design with extensive Non-Recurring Engineering in FY18 and FY19 to make it more operational for the USMC. Changes includes relocating components to improve crew visibility, relocation of radar to allow reinstallation and use of smoke grenades, redesigned sponson boxes to lower launcher profile and maintain required Basic Item Issue storage, redesign armor for crew backblast protection and uninhibited operation of Stabilized Commander's Weapon Station (SCWS) .50-cal Machine Gun, relocation of internal turret controls and displays for better Human Factors and crew employment, and investigation of cyber issues. ***FY 2018 OCO Plans:*** N/A					
Title: Mine Resistant Ambush Protected Family of Vehicles	0.826	0.589	0.547	0.000	0.547
Articles:	-	-	-	-	-
FY 2016 Accomplishments: -Continued research and development of Engineering Change Proposals (ECPs) and conducted armor ballistic testing in support of survivability and mobility upgrades. ***FY 2017 Plans:*** -Continue research and development of Engineering Change Proposals (ECPs) and armor ballistic testing in support of survivability and mobility upgrades. ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Continue research and development of Engineering Change Proposals (ECPs) efforts such as "material improvements" to ballistic glass or other safety issues and new armor ballistic testing in support of survivability and mobility upgrades. ***FY 2018 OCO Plans:*** N/A					
Title: Corrosion Prevention and Control (CPAC)	2.270	2.597	2.907	0.000	2.907
Articles:	-	-	-	-	-
FY 2016 Accomplishments: -Continue to identify new corrosion control products, materials, processes and procedures that impact Marine Corps corrosion control processes through Science and Technology initiatives in some of the following areas: Thermally Sprayed Metal Coatings (TSMC) for Corrosion Protection of Areas Subject to Wear, Compatibility of Chemical Agent Resistant Coating (CARC) Systems During Re-Paint, Chip Resistant, Flexible Nonslip Coatings and Corrosion Resistant Insulating Foams. Materials project where evaluations are ongoing on vendor product submission to determine suitability prior to use on USMC Ground equipment. ***FY 2017 Plans:*** -Continue to identify new corrosion control products, materials, processes and procedures that impact Marine Corps corrosion control processes through Science and Technology initiatives in some of the following areas: Thermally Sprayed Metal Coatings (TSMC) for Corrosion Protection of Areas Subject to Wear, Compatibility of Chemical Agent Resistant Coating (CARC) Systems During Re-Paint, Chip Resistant Coatings, Flexible Nonslip Coatings and Corrosion Resistant Insulating Foams. Along with stewardship of the Corrosion Products, Processes and Materials project for vendor submissions to the Marine Corps and product qualification for chip and abrasion resistant coatings and other Corrosion Prevention Compounds that retard/arrest corrosion. The RDT&E efforts will also support field evaluations and product test in advance of fielding to determine suitability. ***FY 2018 Base Plans:*** -Continue to identify new corrosion control products, materials, processes and procedures that impact Marine Corps corrosion control processes through Science and Technology initiatives in some of the following areas: Thermally Sprayed Metal Coatings (TSMC) for Corrosion Protection of Areas Subject to Wear, Compatibility of Chemical Agent Resistant Coating (CARC) Systems During Re-Paint, Chip Resistant Coatings, Flexible Nonslip Coatings and Corrosion Resistant Insulating Foams. Along with stewardship of the Corrosion Products, Processes and Materials project for vendor submissions to the Marine Corps and product qualification for chip					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
and abrasion resistant coatings and other Corrosion Prevention Compounds that retard/arrest corrosion. The RDT&E efforts will also support field evaluations and product test in advance of fielding to determine suitability. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.861	4.984	18.298	0.000	18.298

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/6670: *Items Less than $5M - CPAC & Eng Mods & Tool Kits*	5.146	4.342	4.408	-	4.408	4.646	4.742	4.833	4.930	Continuing	Continuing
• PMC/2061: *M1A1 Modification Kit*	11.412	12.577	14.883	-	14.883	15.246	15.390	35.699	43.176	Continuing	Continuing
• PMC/6520: *EOD Systems - MRAP*	0.508	0.346	1.152	-	1.152	1.216	1.243	1.269	1.293	Continuing	Continuing
• PMC/7000: *M1A1 Modification Kit*	2.069	4.380	0.362	-	0.362	0.000	0.000	0.000	0.000	0.000	6.811

Remarks

M1A1 Modification Kit: APS development efforts in FY16-20 enable the planned procurement of APS systems and supporting counter-measures in FY21-22.

D. Acquisition Strategy

(U) The M1A1 modification kits program will leverage Army initiatives to the maximum extent and incorporate modifications to adapt Army solutions to the USMC environment. The USMC will research, develop, and evaluate programs to improve the survivability and lethality of the USMC tank. These efforts include the Abrams Integrated Display and Targeting System (AIDATS), threat detection and warning, situational awareness, survivability, and ownership cost reduction work. The USMC will refine the Active Protection System (APS) technology demonstrator's design, pursuing a Milestone B decision with follow on Non-Recurrent Engineering in FY18 and FY19 in preparation for live fire testing and evaluation conducted along with the Army in FY20. Procurement of APS systems and supporting counter-measures is planned in FY21 and FY22.

(U) Engineer Mods and Tool Kits: This is a roll-up line of various engineering efforts, modifications and other related items less than $5 Million each. This program provides for significant improvements to various pieces of engineering equipment by enhancing their capabilities and improving readiness.

(U) Corrosion Prevention and Control (CPAC) Program: The Program will execute the RDT&E Program to the Naval Surface Warfare Center - Carderock Division Corrosion Research and Engineering Branch and the Naval Research Laboratory for a comprehensive program aimed at identifying and certifying new corrosion control products, materials, processes and procedures for legacy and new acquisition.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*

(U) Mine Resistant Ambush Protected (MRAP): The Program will execute RDT&E funds to research, develop, and evaluate survivability and mobility upgrades efforts such as the Cougar Egress Upgrades, Ballistic Glass or Other Safety Issues, New Armor Technology and Ballistic Testing. Work will be accomplished through centers of excellence, such as Naval Surface Warfare, Panama City, as well as the private sector to conduct research and analysis associated with the development of modifications and modeling and simulation efforts.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineer Mod Kit	TBD	MCSC : TBD	0.000	0.000		0.479	Jan 2017	0.000		-		0.000	0.000	0.479	-
MRAP Modifications	WR	VARIOUS : VARIOUS	0.802	0.329	Apr 2016	0.188	Dec 2016	0.188	Dec 2017	-		0.188	Continuing	Continuing	Continuing
M1A1 Modifications - APS	MIPR	TACOM : Warren, MI	0.000	4.289	Jun 2016	0.069	Apr 2017	8.043	Dec 2017	-		8.043	Continuing	Continuing	Continuing
M1A1 Modifications - FEP STS	SS/CPFF	Raytheon : McKinney, TX	0.000	0.000		0.325	Aug 2017	0.400	Feb 2018	-		0.400	Continuing	Continuing	Continuing
M1A1 Modifications - FEP Symbology	MIPR	DMEA : Sacramento, CA	0.000	0.563	May 2016	0.000		0.000		-		0.000	0.000	0.563	-
M1A1 Modifications - Laser Upgrade	MIPR	ARDEC : Picatinny, NJ	0.000	0.000		0.000		0.384	Jan 2018	-		0.384	Continuing	Continuing	Continuing
M1A1 Modifications - Communication Mod.	MIPR	SSC LANT : Charleston, NC	0.000	0.000		0.000		0.200	Feb 2018	-		0.200	Continuing	Continuing	Continuing
M1A1 Modifications - TWMP	MIPR	BENET Labs : Albany, NY	0.000	0.000		0.000		0.200	Nov 2017	-		0.200	Continuing	Continuing	Continuing
M1A1 Modifications - APS / IMOD	MIPR	TACOM : Warren, MI	0.000	0.000		0.925	Apr 2017	1.214	Jan 2018	-		1.214	0.000	2.139	-
M1A1 Modifications - APS	C/CPFF	Raytheon : McKinney, TX	0.000	0.000		0.000		0.743	Mar 2018	-		0.743	0.000	0.743	-
M1A1 Modifications - GPS LP	MIPR	MCSC : Quantico, VA	2.556	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MRAP Engineering	WR	NSWC : Panama City, FL	2.212	0.000		0.126	Dec 2016	0.129	Dec 2017	-		0.129	Continuing	Continuing	Continuing
M1A1 Modifications - AGTS	MIPR	PM TRASYS : Orlando, FL	3.177	0.000		0.000		1.444	May 2018	-		1.444	Continuing	Continuing	Continuing
M1A1 Modifications - AIDATS EMD	MIPR	ABERDEEN PROVING GROUND : Aberdeen, MD	2.988	0.477	Jan 2016	0.000		0.000		-		0.000	0.000	3.465	-
M1A1 Modifications - ADL II	MIPR	Picatinny Arsenal : Picatinny, NJ	1.174	0.000		0.000		1.600	Jan 2018	-		1.600	Continuing	Continuing	Continuing
Prior Year Cumulative. Funding	Various	VARIOUS : VARIOUS	41.469	0.000		0.000		0.000		-		0.000	0.000	41.469	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	54.378	5.658		2.112		14.545		-		14.545	-	-	-

Remarks

M1A1 Modifications - APS / IMOD: Payments pursuant to adding the United States Marine Corps as a principal organization involved in the Trophy Active Protection System Accelerated Characterization (TAAC) Project Agreement (PA) with the Israel Ministry Of Defense (IMOD).

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CPAC	C/BA	TACOM : Warren, MI	0.000	0.525	Mar 2016	0.000		0.000		-		0.000	0.000	0.525	-
Prior Year Cumulative Funding	Various	Various : various	0.300	0.000		0.000		0.000		-		0.000	0.000	0.300	-
CPAC	C/FFP	NSWC-CD : Bethseda, MD	1.303	0.145	Dec 2015	1.025	Dec 2016	1.019	Dec 2017	-		1.019	0.000	3.492	-
		Subtotal	1.603	0.670		1.025		1.019		-		1.019	0.000	4.317	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MRAP FoV Ballistic Evaluations	MIPR	ATC : Aberdeen, MD	2.749	0.497	Jun 2016	0.275	Dec 2016	0.230	Dec 2017	-		0.230	Continuing	Continuing	Continuing
Prior Year Cumulative Funding	Various	Various : Various	1.500	0.000		0.000		0.000		-		0.000	0.000	1.500	-
Engineer Modifcation Kits	Various	Various : Various	0.000	0.000		0.000		0.616	Feb 2018	-		0.616	0.000	0.616	-
Engineer Modification Kits	MIPR	Aberdeen Proving Grounds : Aberdeen MD	1.866	0.436	Feb 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
CPAC	WR	NSWC-CD : Bethseda, MD	9.622	1.215	Dec 2015	1.072	Dec 2016	1.388	Dec 2017	-		1.388	0.000	13.297	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 2316 / *Combat Service Support Eng Equip*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CPAC	WR	NRL : Arlington, VA	0.887	0.385	Dec 2015	0.500	Dec 2016	0.500	Dec 2017	-		0.500	0.000	2.272	-
		Subtotal	16.624	2.533		1.847		2.734		-		2.734	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	72.605	8.861		4.984		18.298		-		18.298	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*

Expedited APS Funding & Schedule

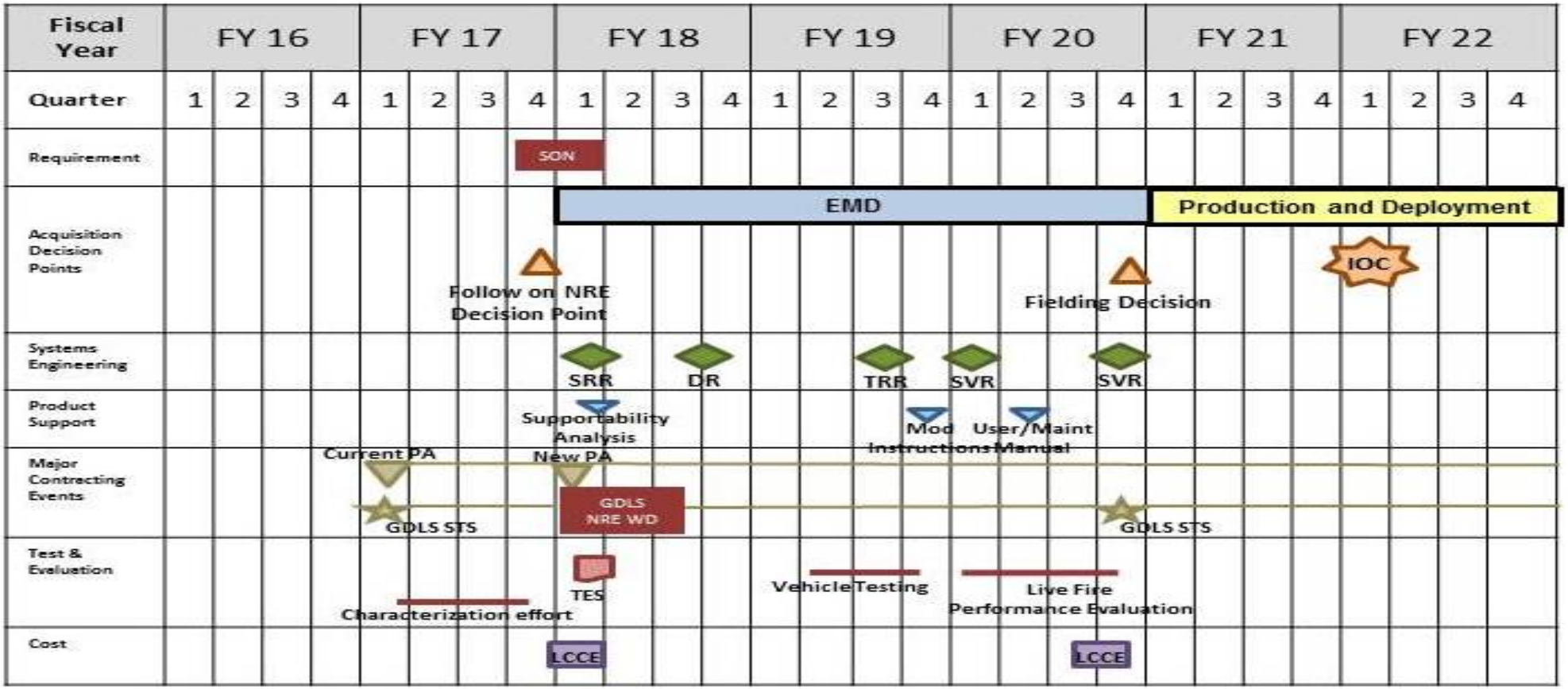

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2316 / *Combat Service Support Eng Equip*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2316				
Expedited APS Schedule: MDD	1	2018	1	2018
Expedited APS Schedule: EMD	1	2018	4	2020
Expedited APS Schedule: Production and Deployment	1	2021	4	2022
Expedited APS Schedule: MS C	4	2020	4	2020
Expedited APS Schedule: IOC	1	2022	1	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 2509 / *Motor Transport Mod*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2509: *Motor Transport Mod*	43.577	1.227	1.578	1.213	-	1.213	1.222	1.251	1.279	1.304	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Marine Corps Tactical Motor Transport Modification (MTM) project manages procurement and life cycle sustainment for more than 25,000 light fleet vehicle and tactical trailer principle end items. A sustained effort is maintained in the Marine Corps for development and testing in support of fleet Service Life Extension Program (SLEP) initiatives, vehicle quality deficiency resolutions, safety initiatives, environmental/state transportation mandated vehicle changes, and system component refresh modifications efforts to include addressing deficiencies of HMMWV vehicles due to up armoring and age degradation of the fleet. Since transportation asset operational availability declines at a steady rate over time, SLEP, fleet overhauls, and enhanced depot level modifications are essential in maintaining a viable transportation capability in the Marine Corps Operating Forces.

The M88A2 Modification program funds research, development and testing of improvements in all areas of the M88A2 HERCULES vehicle, which provides the MAGTF heavy combat recovery capability. Funding addresses obsolescence and Engineering Change Proposals (ECPs) to improve performance and develop safety related ECPs to correct hazards noted during the standard day to day operation of the M88A2 Improved Recovery Vehicle.

The HMMWV Sustainment Modification Initiative (SMI) program was cancelled effective FY 2016. FY 2015 funding supported engineering studies and analysis to evaluate the vehicle performance, safety and reliability. This program does not have funding beyond the FY15 HMMWV project. Future Legacy HMMWV safety and reliability efforts will be funded as a part of the Motor Transport Modification project 2509.

P-19 Replacement (P-19R) is replacing the obsolete A/S32P-19A Crash Fire Rescue fleet in support of expeditionary airfield operations and the supporting establishment. The vehicle is outfitted with advanced fire suppression equipment and provide rescue and aircraft fire fighting capabilities to permanent and expeditionary airfields throughout the Marine Corps. The P-19 Replacement may also be employed to fight structural fires in support of base camps and as firefighting support to other elements of the Marine Air Ground Task Force (MAGTF), such as ammunition supply points, Petroleum, Oil, and Lubricant (POL) distribution points, or hazardous material storage facilities.

The Family of Trailers & Ancillary Equipment program will explore options for "lightening the Marine Air Ground Task Force (MAGTF)" weight and cube attributes of the light and medium/heavy trailer fleet. Seeking technologies and other current and emerging options that can be employed to achieve optimum lift capability while constrained to the desired weight and cube. Transportation and expeditionary goals will be considered in the research and development phase for the trailer fleet. Will develop long-term modernization plans for the medium and heavy trailers within the Marine Corps to address operating safety enhancements, mission maintainability enhancements, and crew ergonomic improvements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: M88A2 HERCULES	0.290	0.333	0.352	0.000	0.352
Articles:	-	-	-	-	-
Description: NOTE: The FY 2017 to FY 2018 overall program funding decrease of $0.365M is a result of fewer system modifications developed and system modification tests conducted by both the P-19 Replacement and the Motor Transport Modification (MTM). ***FY 2016 Accomplishments:*** -Initiated the development of modifications for the M88A2 and supporting equipment to increase Reliability, Availability, and Maintainability (RAM), decrease operating costs, and address obsolescence, crew ergonomics, Command and Control improvements. ***FY 2017 Plans:*** -Continue the development of modifications for the M88A2 and supporting equipment to increase Reliability, Availability, and Maintainability (RAM), decrease operating costs, and address obsolescence, crew ergonomics, Command and Control improvements. ***FY 2018 Base Plans:*** -FY 2017 to FY 2018 funding increase of $0.019M will support the development of Artic Mobility solution set in response to Marine Forces Europe (MARFOREUR) Universal Needs Statement (UNS) addressing M88A2 ability to support Tanks in artic conditions. -Continue the development of modifications for the M88A2 and supporting equipment to increase Reliability, Availability, and Maintainability (RAM), decrease operating costs, and address obsolescence, crew ergonomics, Command and Control improvements. ***FY 2018 OCO Plans:*** N/A					
Title: P-19 Replacement	0.093	0.326	0.067	0.000	0.067
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Completed testing of the P-19R in support of FRP. - Initiated development of system modifications that include: (1) Auxiliary Power Unit (APU) phase I and test 10KW (kilowatt) for Engineering Change Proposals (ECP's);					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(2) APU and Heating Ventilation Air Conditioning (HVAC) phase II for ECP's. ***FY 2017 Plans:*** - Complete development, test, and integrate system modifications to improve vehicle performance and correct deficiencies identified on P-19 Replacement in support of FRP. System modifications included: (1) APU phase I and test 10kW for ECP's; (2) APU and HVAC phase II for ECP's. - Complete development of system modifications to the 10 kW APU which will allow the vehicle crew to operate the HVAC independent of the primary engine; this resulted in fuel consumption savings and reduced maintenance on the primary engine. ***FY 2018 Base Plans:*** - The decrease of $259K from FY17 to FY18 is due to the completion of some prior year development and testing activities. - Initiate the development and test activities such as reliability and snow and ice testing to satisfy mobility requirement for Marine Corps Prepositioning Program-Norway (MCPP-N). - Initiate the development of consistent Snow and Ice tire chain solution for the vehicles. - Initiate tests and evaluations of the Snow and Ice tire chains to be deployed to vehicle fleet. ***FY 2018 OCO Plans:*** N/A					
Title: Motor Transport Modification (MTM)	0.103	0.724	0.594	0.000	0.594
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Completed efforts to evaluate, test, and integrate system modifications to improve vehicle performance and correct deficiencies identified for application on Motor Transportation light, medium, and heavy tactical assets. ***FY 2017 Plans:*** Continue to evaluate, test, and integrate system modifications for the Legacy Light Tactical Vehicles to ensure effectiveness, improve vehicle safety, performance, and correct deficiencies identified for application on Motor Transportation Light Tactical assets, enabling the fleet to maintain mobility requirements. ***FY 2018 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue to evaluate, test, and integrate system modifications for the Legacy Light Tactical Vehicles to ensure effectiveness, improve vehicle safety, performance, and correct deficiencies identified for application on Motor Transportation Light Tactical assets, enabling the fleet to maintain mobility requirements. ***FY 2018 OCO Plans:*** N/A					
Title: Family of Trailers & Ancillary Equipment ***Articles:*** ***FY 2016 Accomplishments:*** Continued testing to ensure effectiveness of Light Tactical Trailers (LTT) with the High Mobility Multipurpose Wheeled Vehicle (HMMWV) fleet and also for the Medium/Heavy Tactical Trailers designed for the Medium Tactical Vehicle replacement (MTVR)/Logistical Vehicle System Replacement (LVSR), enabling the fleet to maintain mobility requirements. ***FY 2017 Plans:*** Continue testing to ensure effectiveness of the Medium/Heavy Tactical Trailers designed for the Medium Tactical Vehicle replacement (MTVR)/Logistical Vehicle System Replacement (LVSR), enabling the fleet to maintain mobility requirements. Durability analysis is focus of FY17 efforts. The FY16 to FY17 decrease ($0.614M) is due to completion of testing to address MTVR Trailer safety and performance needs. ***FY 2018 Base Plans:*** Continue testing to ensure effectiveness of the Medium/Heavy Tactical Trailers designed for the Medium Tactical Vehicle replacement (MTVR)/Logistical Vehicle System Replacement (LVSR), enabling the fleet to maintain mobility requirements. The FY17 to FY18 increase ($0.005M) is due to Trailer Performance Test/Durability Analysis (rust/corrosion) continuing efforts. ***FY 2018 OCO Plans:*** N/A	0.741 -	0.195 -	0.200 -	0.000 -	0.200 -
Accomplishments/Planned Programs Subtotals	1.227	1.578	1.213	0.000	1.213

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/5230: *Motor T Mod*	2.554	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	104.119

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/5097: *Family of Tactical Trailers*	3.757	2.691	1.938	-	1.938	3.166	3.237	3.301	3.369	Continuing	Continuing
• PMC/2061-01: *M88A2 HERCULES Mod*	2.725	2.673	2.895	-	2.895	2.951	3.011	3.070	3.131	Continuing	Continuing
• PMC/4630-01: *M88A2 HERCULES Mod*	0.163	0.164	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/5006-02: *P-19*	16.366	87.141	32.141	-	32.141	0.334	0.364	0.369	0.380	Continuing	Continuing
• PMC/5050: *Motor T Mod*	9.292	13.292	21.824	-	21.824	13.554	13.867	14.145	14.435	Continuing	Continuing

Remarks

Funding for Motor Transport Modifications moves from BLI 5230 to BLI 5050 beginning in FY 2017. FY16 value for 5230 above is only for funding associated with light and medium tactical vehicles as well as trailers.

D. Acquisition Strategy

The M88A2 HERCULES program leverages Army developmental projects to create a system that more readily meets Marine Corps Heavy Recovery Vehicle requirements. Improvements include modifications addressing safety, reliability, and technology upgrades.

The HMMWV Sustainment Modification Initiative (SMI) program was cancelled effective FY 2016. FY 2015 funding supported engineering studies and analysis to evaluate the vehicle performance, safety and reliability. Efforts will be focused on developing improvements to vehicle performance, safety and reliability.

The P-19 Replacement leverages COTS and NDI components in an effort to minimize costs, test requirements, and reduce development time. P-19R will supplant the aging A/S32P-19A fleet in support of expeditionary airfield operations and the supporting establishment. The vehicle will be outfitted with advanced fire suppression equipment and provide rescue and aircraft fire fighting capabilities to permanent and expeditionary airfields throughout the Marine Corps. The P-19 Replacement may also be employed to fight structure fires in support of base camps and as firefighting support to other elements of the MAGTF, such as ammunition supply points, Petroleum, Oil, and Lubricants (POL) distribution points, or hazardous material storage facilities. A Firm Fixed Price (FFP) contract was awarded in May 2013 with step-ladder pricing for procurement of large quantities. The contract structure provides for production, testing, and training. A delivery order can be placed in any year for production quantities up to 200 vehicles.

Motor Transport Modification (MTM) funding will focus on streamlined acquisitions of Commercial-Off-The-Shelf/Non-Developmental Items (COTS/NDI) that can be identified, integrated, and tested in a short amount of time. MTM funding will be used for modifications required to increase MTM fleet readiness, safety and reliability. Successful modifications and tests are intended for follow-on procurement and incorporation into existing system component upgrades, SLEPs, or rapid COTS/NDI fielding for the Fleet Marine Forces (FMF).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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The Family of Trailers & Ancillary Equipment (FTT) management strategy will use RDT&E funding to explore current and new technological options that can be used to achieve optimum lift within the desired weight and cube constraints in support of the "Lightening the MAGTF" initiative, as well as sustaining and/or improving capabilities. Transportation and expeditionary goals will be considered in the research and development for the light and medium/heavy trailer fleet to include (but not limited to) the M1076 PLS (Palletized Load System) Trailer, MK1077 Flatrack, MTVR Trailer, M870 Ton Low Bed, Mk970 Tactical Refueler and the Flatrack Refueler Capability (FRC).

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*				Project (Number/Name) 2510 / *MAGTF CSSE & SE*			
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
2510: *MAGTF CSSE & SE*	20.787	8.414	5.090	3.877	-	3.877	4.906	4.027	4.112	4.193	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Environmental Control Equipment, Mobile Power Equipment and Advanced Power Sources are a part of Expeditionary Energy Initiatives.

A. Mission Description and Budget Item Justification

Environmental Control Equipment:
The Family of Environmental Control Equipment consists of Environmental Control Units, Field Refrigeration Systems, Integrated Trailer ECU and Generator Systems, and Cooling and Refrigeration Expeditionary Tool Kits. These systems provide required heating, cooling, storage, and servicing for systems throughout the Marine Corps. Current efforts seek to replace all legacy ECUs with systems of higher reliability and higher efficiency using EPA-approved refrigerants, more energy efficient enhanced mobility, easier to repair, and quieter than their predecessors. With environmental control systems consuming 50-70% of tactical electric power in theater, this savings will be a significant contribution to reducing the USMC fuel demand, and lightening the Marine Air-Ground Task Force (MAGTF). The Warfighter benefit includes a decreased logistics footprint, less reliance on petroleum-derived fuels, increased local energy security, and reduced tanker losses (fewer on the road). The operational imperative to reduce fuel usage will consequently reduce refueling operations and exposing Marines to hazardous fuel convoy operations.
Efforts such as research, development, integration testing of
(1) Field Refrigeration Systems (FRS) Refrigerant Unit (RU) replacement. This effort seeks to replace legacy RUs in current USMC Large and Small FRSs complying with EPA regulations while increasing efficiency thus reducing overall power requirements/demands.
(2) The Enhanced Environmental Control Unit (E2CU) program is the second generation of a family of environmental control units from 9,000 BTU to 60,000 BTU/Hr cooling output. The E2CU program will provide tactical Heating, Ventilation and Air Conditioning (HVAC) and superior reliability for all MAGTF units in all operational concepts. E2CU will have significant average fuel efficiency improvements over the current ECU family has been demonstrated while complying with newer EPA regulations on refrigerants.

Mobile Power Equipment:
The Family of Mobile Electric Power Equipment consists of command and control systems for power management and distribution (intelligent power management), tactical generators ranging from 2 to 200 kilowatts, power distribution systems, energy storage systems, load banks, floodlights, cabling, and electrician tool kits.
This equipment is to procure, field, manage and provide electricity on the battlefield. Systems may be mounted on prime movers, skids or trailers. Systems support maneuver, combat support, and combat service support units requiring tactical power to operate weapons systems, Command, Control, Communications, Computers and Intelligence (C4I) systems, medical and messing facilities, environmental control equipment, and water purification systems. With over 10,000 generators and using diesel engines in the Operating Forces, improving their fuel efficiency and reliability will be a significant contribution to reducing the USMC fuel demand, and lightening the MAGTF. The Warfighter benefit includes a decreased logistics footprint, less reliance on petroleum derived fuels, increased local energy security, and reduced

tanker losses (fewer on the road). The operational imperative to reduce fuel usage will consequently reduce refueling operations and exposing Marines to hazardous fuel convoy operations.

Efforts encompass research, development, integration, and testing of the following items:
(1) Intelligent Power Management Systems (IPMS) which support a robust, scalable solution to interconnect, control, store and distribute power from various sources. As a result, the power requirements will be met in a more efficient manner thus reducing fuel consumption. The IPMS will use multiple electrical inputs from military generators, vehicles and renewable sources. Subsystems include Digital Control System (DCS), Energy Storage Unit (ESU), and Intelligent Power Distribution System (IPD).
(2) Large Advanced Power Sources (LAMPS) procurement of newer more fuel efficient large format generators (100-200kw) replacing the legacy generators and ensuring commonality with the Army large format generators.

Advanced Power Sources:
The Advanced Power Sources (APS) efforts will focus on achieving the Marine Corps goal of lightening the Marine Air Ground Task Force (MAGTF) through reduced logistical fuel resupply needs. The Mobile Electric Hybrid Power Source (MEHPS) Capability Development Document (CDD) addresses the USMC Expeditionary Water and Waste (E2W2) Initial Capabilities Document (ICD) and supports the MAGTF intent to: travel lighter and faster, use less fuel, depend less on the supply chain; and reduce energy production, storage, and distribution requirements. This CDD addresses the Operational Energy (OE) ICD identifying the power and energy criticalities to the Joint Force. The Mobile Electric Hybrid Power System (MEHPS) will focus on hybrid power systems capable of improved fuel efficiency and silent operations in the 0.5-5kW and 10-15kW power range. These systems will be smaller, lighter and more efficient systems that reduce the demand for fossil fuels, extending the Commander's operational reach. These efforts will transition into production of systems that integrate with the Tactical Quiet Generator (TQG), Advanced Medium Mobile Power Sources (AMMPS), and future generator sets. The Battery Maintenance and Storage Shelter effort will focus on developing a modular solution to store and maintain a variety of battery form factors and chemistries. This will provide an environmentally protected, deployable battery maintenance and storage shelter with the capability to maintain and condition deployable batteries that will significantly decrease O&M costs to the Fleet by extending the life of fielded batteries.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Environmental Control Equipment	0.192	0.262	0.507	0.000	0.507
Articles:	-	-	-	-	-
Description: The FY17 to FY18 funding increased by $0.245M to continue product development of future E2CU systems.					
FY 2016 Accomplishments: -Initiated design for the Enhanced Environmental Control Units to increase energy efficiency via cooling environmental control units.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Initiate and complete evaluation and testing of USMC Field Refrigeration Units (FRU) replacements. ***FY 2018 Base Plans:*** -Continue design for the Enhanced Environmental Control Units to increase energy efficiency via cooling environmental control units. ***FY 2018 OCO Plans:*** N/A					
Title: Mobile Power Equip/Hybrid Generator/Next Gen Power Distribution System ***Articles:*** ***Description:*** The FY17 to FY18 funding decreased by $0.567M due to completion of product development for Micro-Grid Storage/Intelligent Power Management (IPM) effort. ***FY 2016 Accomplishments:*** -Initiated product development of commercial Micro-Grid Storage/Intelligent Power Management (IPM)effort. ***FY 2017 Plans:*** -Complete product development of commercial Micro-Grid Storage/Intelligent Power management (IPM) effort. -Initiate testing and integration of commercial Micro-Grid Storage/Intelligent Power Management (IPM)effort into subsystems. ***FY 2018 Base Plans:*** -Continue testing and evaluation for the Micro-Grid Storage/Intelligent Power Management (IPM) effort. ***FY 2018 OCO Plans:*** N/A	2.830 -	1.841 -	1.274 -	0.000 -	1.274 -
Title: Advanced Power Sources ***Articles:*** ***Description:*** The FY17 to FY18 funding decreased by $0.891M due to the completion of Mobile Electric Hybrid Power Sources (MEHPS) testing. ***FY 2016 Accomplishments:*** MOBILE ELECTRIC HYBRID POWER SOURCES (MEHPS)	5.392 16	2.987 6	2.096 -	0.000 -	2.096 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Completed award of two (2) RDT&E contracts for Engineering, Manufacturing and Development (EMD) of the Mobile Electric Hybrid Power Sources (MEHPS). Each contractor produced 8 test articles for a total of 16 test articles. Results of the developmental testing used to refine the performance specification in support of the production and deployment phase. ***FY 2017 Plans:*** MOBILE ELECTRIC HYBRID POWER SOURCES (MEHPS) -Initiate Mobile Electric Hybrid Power Sources (MEHPS) developmental testing and Battery Storage and Maintenance Shelter EMD contract award. ***FY 2018 Base Plans:*** MOBILE ELECTRIC HYBRID POWER SOURCES (MEHPS) -Conduct Mobile Electric Hybrid Power Sources (MEHPS) Field User Evaluation (FUE) to define system requirements and assess military utility, usability, human factors and system capabilities. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	8.414	5.090	3.877	0.000	3.877

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/6054: *Environmental Control Equipment*	0.000	0.018	1.405	-	1.405	4.534	3.385	3.453	3.521	Continuing	Continuing
• PMC/6366-1: *Mobile Power Equipment*	0.738	3.493	6.694	-	6.694	9.744	6.094	6.213	6.340	Continuing	Continuing
• PMC/6366-2: *Advanced Power Sources*	8.217	14.480	3.216	-	3.216	15.311	15.617	15.925	16.244	Continuing	Continuing

Remarks

D. Acquisition Strategy

MCPC: 268198 Environmental Control Units: Initial focus on development of more efficient 36,000 BTU/Hr and 60,000 BTU/Hr size model Environmental Control Units (ECUs), since they make up the greatest percentage of the inventory and are used extensively for shelter heating and cooling. Full and open competition. Three contractors to develop and deliver prototypes in two size models. Government testing to validate performance. Single contractor to produce both models using multi-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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year ID/IQ production contract. Low Rate Initial Production (LRIP), followed by LRIP testing, then Full Rate Production (FRP) to procure using PMC funds on annual Delivery Orders. ECUs are organically supported by Marines.

MCPC: 268298/Mobile Power Sources: Focus on development of Micro-Grid Storage/Intelligent Power Management (IPM). Acquisition Strategy is for Full and Open competition. Government testing to validate performance on prototypes followed by Full Rate Production (FRP) to procure on multiple Delivery Orders.

MCPC: 110402/Advanced Power Sources: The acquisition strategy is to focus on development of the Mobile Electric Hybrid Power System (MEHPS). This R&D effort will focus on achieving the Marine Corps goal of lightening the MAGTF through reduced logistical fuel resupply needs, extending the Commander's operational reach. The development will focus on making these systems smaller, lighter and more efficient. The MEHPS program will purchase 8 medium and 8 light systems from two vendors through competitively awarded EMD contracts. The MEHPS systems will undergo rigorous electrical, environmental, safety, and performance testing to ensure they are robust and meet user requirements. Information learned in the EMD phase will help define the performance specification that will be used to award a full and open production contract. The Battery Maintenance and Storage Shelter will purchase 3 systems from 2 vendors through competitively awarded EMD contracts. Both systems will undergo rigorous electrical, environmental, safety, and performance testing to ensure the systems are robust and meet user requirements. Information learned in the EMD phase will help define the performance specifications that will be used to award full and open production contracts.

E. Performance Metrics

E2CU: Energy efficiency; size; weight; EPA-approved refrigerant; affordability; organically supportable.
MOBILE POWER: Energy efficiency; size; weight; affordability; organically supportable.
MEHPS: 55% savings in fuel and 80% reduction in generator runtime versus a standard 10 Kilowatt (kW) Tactical Quiet Generator (TQG).
BMASS: Energy efficiency; size; weight; ability to charge specified batteries.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
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COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2929: *Testing Measuring Diag Equip & SE*	8.851	0.785	0.538	0.577	-	0.577	0.617	0.632	0.645	0.657	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Marine Corps Family of Automatic Test Systems (ATS), formerly called Third Echelon Test Sets (TETS), provides automatic test program capability for use by technicians both in garrison and the forward edge of the battlefield; specifically in the areas of interactive electronic technical manuals, condition/predictive based maintenance, and embedded sensors and prognostics.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Automatic Test Systems (ATS)	0.785	0.538	0.577	0.000	0.577
Articles:	-	-	-	-	-
FY 2016 Accomplishments: -Completed advanced technology concepts for automatic test and integrate the subsystems and components into fielded automatic test solutions to support weapon systems.					
FY 2017 Plans: -Continue to develop new advanced technology concepts for automatic test and integrate the subsystems and components into fielded automatic test solutions to support weapon systems.					
FY 2018 Base Plans: -Continue to develop new advanced technology concepts for automatic test and integrate the subsystems and components into fielded automatic test solutions to support weapon systems.					
FY 2018 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.785	0.538	0.577	0.000	0.577

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/4181: *Automatic Test Systems (ATS)*	7.310	8.782	16.463	8.241	24.704	8.493	13.195	5.101	5.204	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

Automatic Test Systems (ATS) acquisition is being done through U.S. Army Armament Research, Development & Engineering Center (ARDEC), Picatinny contracts; In-house at Marine Corps Logistics Command (MCLC), Albany, GA; In-house at Naval Surface Warfare Center, Crane, IN and Commercial Technologies for Maintenance Activities (CTMA) at OSD, Washington D.C.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
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COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9C90: *MTVR Mod*	45.235	3.571	0.740	1.057	-	1.057	1.295	0.139	0.141	0.144	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Medium Transport Vehicle Replacement Modification program line funds numerous modifications and initiatives that are required to address operational priorities, engineering change proposals, safety concerns, support equipment inefficiencies, product quality deficiencies, and other issues that affect vehicle reliability, availability, maintainability, readiness, as well as energy efficiency. A proactive and focused approach ensures proper vehicle sustainment and life-cycle management, and it allows the program office the flexibility to develop and implement improvements as needed to respond to the evolving needs of the Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Product Development	1.969	0.423	0.100	0.000	0.100
Articles:	-	-	-	-	-
Description: NOTE: The overall increase ($0.317M) from FY17 to FY18 is due to additional Fuel Efficiency (FE) performance testing required in FY18.					
FY 2016 Accomplishments: - Initiated product development in support of the Office of Naval Research (ONR) Future Naval Capability (FNC) initiative for fuel economy components on different variants of the MTVR vehicles in preparation of its transition to the program office in late FY 2016, which included the detailed design of individual components and subsystems. - Continued technical reviews on equipment developed. - Continued the development of various ECPs due to continual changes in the threat environment which requires on-going vehicle modifications.					
FY 2017 Plans: - Continue detailed design and integration of fuel efficiency initiatives for the MTVR, building on transition from ONR in late FY 2016. - Continued development of ECPs required to respond to changes in threat environment and on-going vehicle modifications.					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
- Continue developing ECPs required to respond to changes in the threat environment and for on-going vehicle modifications. ***FY 2018 OCO Plans:*** N/A					
Title: Support	1.097	0.121	0.197	0.000	0.197
Articles:	-	-	-	-	-
FY 2016 Accomplishments: - Continued activities supporting the MTVR vehicle such as ECPs, safety, & survivability upgrades in response to continual changes in the threat environment to protect the warfighter and vehicle from possible catastrophic events, in order to meet current and future operations of Expeditionary Force 21. - Continued acquisition planning and logistics analyses associated with fuel efficiency improvements to the MTVR. - Initiated supporting energy initiatives aligning with the Commandant of the Marine Corps (CMC) priority for reducing energy costs, logistics footprint, and an improved environment. ***FY 2017 Plans:*** - Continue to support the energy initiatives, aligning with the Commandant of the Marine Corps (CMC) priority for reducing energy costs, logistics footprint, and an improved environment. - Continue activities supporting the MTVR vehicle such as ECPs, safety, & survivability upgrades in response to continual changes in the threat environment to protect the warfighter and vehicle from possible catastrophic events, in order to meet current and future operations. ***FY 2018 Base Plans:*** - Continue to support the initiatives aligning with the Commandant of the Marine Corps (CMC) priority for reducing energy costs, logistics footprint, and an improved environment. - Continue the myriad activities supporting the MTVR vehicle such as ECPs, safety, & survivability upgrades in response to continual changes in the threat environment to protect the warfighter and vehicle from possible catastrophic events, in order to meet current and future operations. ***FY 2018 OCO Plans:*** N/A					
Title: Test and Evaluation	0.505	0.196	0.760	0.000	0.760
Articles:	-	-	-	-	-

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: - Completed design verification and design qualification testing of the array of various components and subsystems developed to achieve fuel efficiency improvements on the MTVR. - Initiated Fuel Efficiency (FE) Baseline Test & Evaluation efforts supporting FE ECP of the MTVR. Also restarted Energy Initiative Test & Evaluation efforts, which support the CMC's priority for reducing energy costs, logistics footprint, and an improved environment. ***FY 2017 Plans:*** - Continue baseline FE design qualification testing, including a series of Developmental Tests of the various components and subsystems that have been designed to achieve greater fuel efficiency on the MTVR. ***FY 2018 Base Plans:*** - Continue Test & Evaluation efforts supporting ECP/safety mods of the MTVR as required to provide survivability upgrades in response to continual changes in the threat environment to protect the warfighter and vehicle. - Complete the baseline design qualification testing and conduct field user evaluations of components and subsystems that achieve fuel efficiency improvements on the MTVR; evaluations will help determine which components and subsystems have produced the optimal fuel efficiency, using the least amount of fuel with the greatest return on investment potential. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	3.571	0.740	1.057	0.000	1.057

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PMC/5050: *MTVR Motor Transport Mods*	6.996	7.222	6.551	-	6.551	8.232	8.405	8.568	8.739	Continuing	Continuing

Remarks

PMC BLI 5050 Motor Transport Modifications funds multiple programs/projects; only the funding associated with MTVR C9C90 has been provided as Other APPN/LI 5050.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
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D. Acquisition Strategy

The strategy for the MTVR Modification initiative is to aid in the prevention of parts obsolescence, address safety concerns, and respond to emergent threats. A proactive and focused approach ensures proper vehicle sustainment and life-cycle management and allows the program office the flexibility to develop and implement improvements as required to respond to evolving needs.

The strategy for the MTVR Fuel Efficiency (FE) initiative is to continue development activities, as program transitioned in September 2016 from the Office of Naval Research, through the various Warfare Centers. Developmental testing will be conducted to verify FE technology data captured by ONR through the FNC effort. Limited User Evaluation testing via Governmental/Commercial facilities will be conducted on production representative items.

E. Performance Metrics

N/A