

UNCLASSIFIED

FY 2004/2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: February 2003

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 0308601N
PROGRAM ELEMENT TITLE: Modeling and Simulation Support

COST: (Dollars in Thousands)

PROJECT	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
NUMBER &	ACTUAL	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE
TITLE								

R2222 Modeling & Simulation	9,411	7,562	7,044	8,248	8,741	10,797	10,988	11,187
R2810 Enhanced Modeling & Simulation Initiatives	4,734	2,050						
Total	14,145	9,612	7,044	8,248	8,741	10,797	10,988	11,187

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Funds the efforts of the Navy Modeling and Simulation (M&S) Management Office. Supports technical and management initiatives directed by Congress, Department of Defense (DoD) and Secretary of the Navy (SECNAV) with the aim of bringing organization and focus to the development and use of M&S tools throughout Navy and DoD. It provides a central agency for the formulation and implementation of policy and guidance in M&S; represents Navy interests in Joint/other Agencies. Funds efforts to define and coordinate execution of a Navy M&S program to evolve an interoperable and reusable core M&S capability consistent with the M&S technical framework prescribed by DoD. Efforts are organized around four product areas: (1) Engineering Studies and Analysis, to research and define the feasibility and applicability of proposed standards to Navy and to investigate Service-unique requirements for standards or guidance; (2) Products and Services, to develop the policy, standards, technologies, and common tools and services necessary to guide more efficient development and use of M&S across Navy; this includes development and management of the Navy Modeling and Simulation Information System (NMSIS), Navy counterpart to the DOD M&S Resource Repository, to provide a central M&S information resource to reduce stove-piped development, promote tool reuse and support informed M&S investment decisions; (3) M&S Quality Assurance Program, to establish and manage a disciplined process of model verification, validation and accreditation (VV&A) required by current directives; (4) Simulation Experiments, to test distributive simulation technology in fleet exercises, experiments, and pilot efforts which demonstrate and examine the value and limitations of proposed standards (such as High Level Architecture (HLA) and Simulation Based Acquisition (SBA) to mission and program requirements.

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B. PROGRAM CHANGE SUMMARY:

	FY 2002	FY 2003	FY 2004	FY 2005
FY 2003 President's Budget Submission:	12,566	7,783	9,256	10,132
Adjustments from FY 2003 President's Budget:				
Congressional Plus-Up		2,100		
SBIR Reduction	-209			
Efficiencies at NWCF Activities			-59	-73
Cong Rescissions/Adjustments/Undistributed Reductions	-60	-147		
NWCF Rate Adjustments			-21	4
Execution Adjustments	1,848			
Pay Raise/Inflation Adjustments		-124	-161	-178
Program Adjustments			-1,971	-1,637
FY 2004/2005 President's Budget Submission:	14,145	9,612	7,044	8,248

PROGRAM CHANGE SUMMARY EXPLANATION:

Schedule: Not applicable
Technical: Not applicable

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PROGRAM ELEMENT: 0308601N

PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2222

Project Title: Modeling and Simulation

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
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R2222 Modeling & Simulation Support

9,411	7,562	7,044	8,248	8,741	10,797	10,988	11,187
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A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project specifically provides critical coordination of Navy M&S efforts, integrates individual programs into a coherent whole, promotes reuse of resources, and aligns Navy efforts with Joint programs. Develops and maintains a comprehensive repository of models, simulations and authoritative data to support broad-based Navy requirements. Promotes reusability through the Quality Assurance process for models, simulations and data enhanced Interoperability by coordinating and reviewing Navy's transition to Department of Defense (DoD) mandated High Level Architecture (HLA) for distributed simulations. Participates in fleet exercise experiments, distributive simulations and demonstrations (such as Fleet Battle Experiments-I, Virtual at Sea Training (VAST), and Virtual Missile Range (VMR)).

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY 05
Engineering Studies and Analysis	1,600	1,285	1,197	1,402

Conduct engineering studies and analyses aimed at determining the feasibility and applicability of proposed standards or technical approaches to Navy, and at investigating Service-unique requirements for standards or guidance. Individual efforts will focus on developing or evaluating approaches to optimize training, assessments and acquisition functional/mission objectives through more efficient development and use of Modeling and Simulation (M&S). Develop methodologies and standards that will result in model and data reusability and interoperability through the formulation of a technical framework. These standards will support the full range of architecture and engineering design and analysis requirements across Navy.

Provide a M&S degree program through the Naval Postgraduate School, Modeling Virtual Environments and Simulation (MOVES) curriculum.

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PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2222

Project Title: Modeling and Simulation

FY 2002 ACCOMPLISHMENTS:

- Continued to develop and implement the Navy strategy for the transition of Navy M&S to the Office of Secretary of Defense (OSD) mandated M&S interoperability standard, High Level Architecture (HLA). Led Navy HLA implementation planning, reported Navy compliance to Department of Defense (DoD), and participated in the DoD HLA transition working group.
- Prepared analyses for Navy leadership and other intra and inter-Service forums on the issues and technical implications of Navy M&S compliance with HLA.
- Continued to develop attributes for designing modeling standards of communication networks and information systems. This was done in collaboration with the Joint Staff (JS) Networkcentric Warfare System (NETWARS) standards working group.
- Performed analysis of current operational communications infrastructure and derived a method to extract, process and archive information to support operational analysis capabilities through modeling and simulation.
- Initiated studies to identify building block functions required within Defense Information Infrastructure (DII) Common Operating Environment (COE) based Command, Control Communications, Computer, and Intelligence (C4I) systems to support simulation development. This will provide the capability to link Global Command and Control Systems (GCCS) operational functions with simulations.
- Continued to develop and implement a roadmap for migrating existing stand alone training modeling capability into a more integrated, interoperable core suite of capability tailored to the Navy training requirements.
- Continued establishment of a Modeling and Simulation degree program at the Naval Postgraduate School, MOVES curriculum.

FY 2003 PLANS:

- Demonstrate the capability of collecting network data for local and wide area networks at Navy Computer Telecommunications Area Masters Station (NCTAMS) Wahiawa.
- Perform communication burden analysis at a Joint Task Force (JTF)
- Provide capabilities to optimize deployed communication plans
- Determine impact of new technology on Battle Group operation.
- Develop a center for the Study of Potential Outcomes that leverages the expertise and technology developed by faculty of the MOVES Institute at the Naval Postgraduate School.
- Provide interoperability links between C4I systems and internal simulations as the means to integrate existing DII COE services and applications into simulations.

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Project Number: R2222

Project Title: Modeling and Simulation

FY 2004 PLANS:

- Develop a prototype network information assurance (IA) assessment tool to support evaluation of network performance (throughput, delay, network overhead, packet loss and related network Quality of Service metrics), the effects of countermeasures, IA security policies and to identify potential network vulnerabilities.
- The MOVES Institute will work in tandem with the MOVES degree program to provide military relevant thesis topics for research.
- Design additional common simulation "building-block" functions required within DII COE based C4I systems to support simulation development.
- Demonstrate the Embedded Simulation Infrastructure requirements and capability to develop robust simulations within the DII COE and the Global Command and Control System Maritime (GCCS/M).

FY 2005 PLANS:

- Segment the Embedded Simulation Infrastructure and the two Mission Applications and prepare the documentation for test and release in GCCS and GCCS/M.
- Continue to develop a set of standards for communications modeling & simulations for the US Navy.
- The MOVES Institute will work in tandem with the MOVES degree program to provide military relevant thesis topics for research.

	FY 02	FY 03	FY 04	FY 05
Products and Services	3,200	2,571	2,395	2,804

Continue development of common services, tools, and databases. Develop and enhance the Navy Modeling and Simulations Information System (NMSIS), through an evolutionary process, integrating standards, standard models, standard data and connectivity to support all Naval assessments, training, acquisition and operational communities. Manage and maintain the NMSIS, as a central modeling and simulation (M&S) information resource to reduce stove-piped development, promote standardization and reuse and support informed M&S investment decision making across Navy. Provide the necessary planning and coordination of M&S efforts across the Navy M&S Functional Areas, other Services, Office of Secretary of Defense (OSD), Joint Staff, and other agencies to develop policies and procedures necessary for M&S standardization within the Navy. Provide annual updates to the Naval M&S Catalog, Master Plan, and Investment Strategy.

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PROGRAM ELEMENT: 0308601N

PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2222

Project Title: Modeling and Simulation

FY 2002 ACCOMPLISHMENTS:

- Developed and provided an operational implementation of the web-based NMSIS, the Naval component of the Department of Defense (DoD) M&S resource repository (part of the DoD M&S Framework).
- Updated and provided user assistance and support on the Naval M&S Catalog.
- Supported planning and technical coordination of efforts across Navy M&S Functional Areas, other services, OSD, Joint Staff, and other agencies to develop policies and procedures for M&S standardization.
- Coordinated and chaired Navy's M&S Working Group and Navy Flag M&S Steering Group; participated in the Defense M&S Office's M&S working group and the DoD M&S Executive Council, including separate forums for training, assessments & acquisition; and coordination of technical reviews of joint programs and initiatives Joint Simulation System (JSIMS), Joint Warfare Systems (JWARS), Joint Modeling and Simulation System (JMASS) and Networkcentric Warfare System (NETWARS).
- Participated in select OSD and industry sponsored symposia.
- Continued implementation of a Navy M&S Standards Steering Group and a series of Technical Interchange Meetings for the M&S community.

FY 2003 PLANS:

- Staff for signature an updated Navy Modeling and Simulation Master Plan.
- Promote and enhance the state-of-practice and technology within the Navy M&S community.
- Organize and facilitate a series of Navy M&S Technical Interchange Meetings to bring together the Navy M&S community for a direct interchange of M&S requirements, technology, standards and experience. This will occur quarterly as part of policy.
- Provide, via NMSIS, a centralized, single M&S website for M&S users, managers, working groups, and developers to learn about and gain access to existing M&S resources, information and events. It also functions as the Navy's Modeling and Simulation Resource Repository (MSRR) in accordance with the DoD Directive 5000.59, SECNAVINST 5200.38, and OPNAVINST 5200.34.
- Assist in developing Navy's response to new requirements and policy governing High Level Architecture (HLA) compliance.
- Continue to foster and develop the Navy M&S Standards Process that draws M&S experts from the acquisition, training, operational communities, and industry.

FY 2004 PLANS:

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PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2222

Project Title: Modeling and Simulation

- Implement the requirements to perform as the Functional Data Manager for M&S as submitted by Department of Navy (DoN) Chief Information Office (CIO) and defined by SECNAVINST 5000.36.
- Promote and enhance the state-of-practice and technology within the Navy M&S community.
- Continue the development, services, and use of NMSIS until the DoD DIR, SECNAVINST, and OPNAVINST have been rescinded.
- Organize and facilitate a series of Navy M&S Technical Interchange Meetings to bring together the Navy M&S community for a direct interchange of M&S requirements, technology, standards and experience. This will occur quarterly as part of policy.
- Continue to foster and develop the Navy M&S Standards Process that draws M&S experts from the acquisition, training, operational communities, and industry.

FY 2005 PLANS:

- Promote and enhance the state-of-practice and technology within the Navy M&S community.
- Continue the development, services, and use of NMSIS until the DoD Directives, SECNAVINST, and OPNAVINST have been rescinded.
- Organize and facilitate a series of Navy M&S Technical Interchange Meetings to bring together the Navy M&S community for a direct interchange of M&S requirements, technology, standards and experience. This will occur quarterly as part of policy.
- Continue to foster and develop the Navy M&S Standards Process that draws M&S experts from the acquisition, training, operational communities, and industry.

	FY 02	FY 03	FY 04	FY 05
M&S Quality Assurance Program	941	756	705	825

Continue to implement and manage the Modeling and Simulation (M&S) Quality Assurance development of the verification, validation and accreditation (VV&A) process and guidelines for modeling, simulation, and data. Continue to review both new and legacy M&S VV&A plans and reports. Develop and maintain the Naval M&S VV&A repository. Establish and implement a VV&A training curriculum for developers and accreditors. Provide annual VV&A assessment to the Chief of Naval Operations (CNO).

FY 2002 ACCOMPLISHMENTS:

- Continued to implement and manage the M&S Quality Assurance development of the VV&A process and guidelines for modeling, simulation, and data.

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PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2222

Project Title: Modeling and Simulation

- Provided technical review on M&S VV&A plans and reports and provided subject matter expertise and advice on how to meet Navy policy requirements within existing fiscal and programmatic constraints.
- Developed and implemented an initial version of a web-based VV&A Handbook aimed at supporting program managers across the Navy.
- Established and implemented a VV&A training curriculum for developers and accreditors. Provided annual VV&A assessment to the CNO.

FY 2003 PLANS:

- Develop the VV&A Architecture within the VV&A Handbook.
- Develop and staff for signature the draft SECNAVINST 5200.40X update for VV&A.
- Develop a Department of Navy (DoN) M&S VV&A Annual Assessment Report.
- Develop an initial version of a Navy VV&A Documentation Tool (Turbo Tool).
- Develop training/education modules for accreditors and verification and validation (V&V) practitioners.

FY 2004 PLANS:

- Develop the Details of Architecture Implementation within the VV&A Handbook.
- Develop a prototype cost model for estimating the V&V costs.
- Tailor VV&A awareness training for Program Managers.
- Research and identify formal statistical methods that could be used, or are used, to validate M&S to establish credibility beyond the real world boundaries.
- Research and provide M&S acquisition and development guidance.

FY 2005 PLANS:

- Develop Case Studies within the VV&A Handbook.
- Incorporate information developed for training/education into the VV&A Handbook.
- Coordinate with DoD and Services to identify new data entry fields for VV&A common to all Modeling and Simulation Resource Repositories.
- Coordinate with the NMSIS effort to update VV&A data entry fields and Beta test new data entry fields as required.
- Research and develop methodology for evaluating commercial off the shelf (COTS) tools used to develop valid M&S.

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PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2222

Project Title: Modeling and Simulation

	FY 02	FY 03	FY 04	FY 05
Simulation Experiments	3,670	2,950	2,747	3,217

Supports Fleet exercises and experiments through the application of distributed simulation to a wide variety of operational, research and development, training, test and evaluation exercises. Develop and integrate appropriate models and simulations into the Fleet Battle Experiments (FBE). Develop a series of simulation efforts to test and evolve the standards for models, interfaces, data, and tools necessary to enable the seamless access and use of operationally relevant Modeling and Simulation (M&S) to support the range of Navy training, warfare assessments and acquisition requirements.

FY 2002 ACCOMPLISHMENTS:

- Provided Navy share of Services' contribution to maintenance of the simulation protocol needed to use Joint Training Confederation simulations in Joint Task Force Exercises.
- Ensured simulation of Naval forces and supported Navy participation in Joint exercises; supported Ulchi Focus Lens, Synthetic Theater of War, and United Endeavor.
- Identified initial suite of existing M&S tools to offer near term relevance and application to the goals of the Maritime Battle Center (MBC) and the ongoing evaluation of systems and technologies in reoccurring FBE.
- Continued development of a Virtual Missile Range to support Fleet training needs.
- Continued development of the Maritime Virtual Environmental Data Specification (MARVEDS) to provide standards that represent the natural environment. This type of standard for simulation environments is critical to enabling Simulation Based Acquisition (SBA).
- Participated in the Office of Secretary of Defense (OSD) effort to develop a definition, functional description, and implementation plan for simulation-based acquisition.
- Provided core support in the development of a Probability of Raid Annihilation (PRA) Federation for use in surface ship combat system test and evaluation.

FY 2003 PLANS:

- Review metrics required to understand the benefits of modeling and simulation in the training environment as used during the Inter-Deployment Training Cycle (IDTC) for intermediate and advanced phase training.
- Participate in all aspects of planning and conducting the synthetic portion of Joint training events, as directed by Commander Second Fleet (COMSECONDFLT).

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Project Number: R2222

Project Title: Modeling and Simulation

- Research and define Fleet training requirements (the TYCOMs), delivery (the schoolhouses), and execution (Number Fleet and Carrier Groups) to increase the efficiency and effectiveness of intermediate phase training with the use of M&S.
- The fleet battle experimentation process will provide insight to future Navy efforts, organizations and technologies required to carry the Navy into the end of this decade and the next. These efforts will represent a synergetic Modeling and Simulation approach that will benefit Battle Fleet Tactical Training (BFTT), Virtual Training Range, FBE-J and Millennium Challenge (MC02).
- Focus on development of standardized M&S capabilities, including the PRA simulation testbed, PRA Federation Object Model, and improved modeling of threats and the natural environment. These activities will foster and facilitate the development of common capabilities, services, and simulation components that can be re-used across ship classes and Program Executive Offices (PEOs).
- MARVEDS continues as an effort in developing and promulgating standards for representing the natural environment for distributed simulations. Standards include data representations, grids structures for providing data at the appropriate spatial resolutions, serving practices for delivering data at intervals that account for the natural dynamism of the environment and best practices for developing a common understanding of the data (effects models). Focus in FY 03 will be on the Synthetic Environment Data Representation and Interchange Specification (SEDRUS) Naval environmental standards as being submitted to the International Standards Organization (ISO).
- The Virtual Missile Range (VMR) is comprised of "at sea" operational ships detecting realistic, synthetically generated targets, as real threats, and "firing" virtual missiles housed in weapons laboratories. The initial VMR capability will have a virtual TRACKEXs for the Evolved SeaSparrow Missile (ESSM) system with complete virtual missile engagements with the North Atlantic Treaty Organization (NATO) SeaSparrow Missile System (NSSMS).

FY 2004 PLANS:

- Continue to define Fleet training initiatives and M&S enhancements.
- Perform FBE-K using a synergetic Modeling and Simulation approach.
- Continue to develop the PRA Simulation Testbed demonstrations.
- Define the Landing Platform Dock (LPD 17) Amphibious Ship Use Case Environment Concept Model.
- Continue to develop PRA Federation Object Model.
- Forward deployed surface ships are exploring the Virtual at Sea Training Deployable Prototype (VAST DP) to exercise their Naval Surface Fire Support (NSFS) missions. Inclusion of tactical aircraft (TacAir) in the VAST training system completes the combined arms team that trains/fights together. A Virtual at Sea Training - Aviation Component (VAST-AC) allows USN/USMC TacAir to participate in not only their own

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Project Number: R2222

Project Title: Modeling and Simulation

mission specific training but allow participation in amphibious or urban operations training by providing close air support (CAS) services (against synthetic targets/synthetic environment).

- MARVEDS will focus on the standard environmental data as distributed to multiple PEOs.
- The Virtual Missile Range (VMR) will expand its capability to include the NATO SeaSparrow Missile System and upgraded threats.

FY 2005 PLANS:

- Continue to define Fleet training initiatives and M&S enhancements
- Perform FBE-L and the Olympic Challenge series of Joint experimentations using a synergetic M&S approach.
- Complete a VAST range system that provides the capability to conduct training in a virtual environment that would normally require a training range. VAST will also provide required training that would otherwise be cost or schedule prohibitive.
- Document the elements of the maritime virtual environment and effects models that can use it effectively to enable reuse in Naval simulations - best practices where standards are not yet feasible
- VMR will continue to upgrade its virtual threat capabilities.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:

PE 0603235N (Common Picture Advanced Technology)

NON-NAVY RELATED RDT&E:

Not applicable

D. ACQUISITION STRATEGY: Not applicable

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PROGRAM ELEMENT: 0308601N

PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2810

Project Title: Congressional
Plus-ups

Congressional Plus-Ups:

R2810	FY 02	FY 03
Enhanced M&S Initiatives	4,734	2,050

The Enhanced M&S Initiatives will: 1) Support the development and enhancement of technologies that support fleet training, distributed simulation and production engineering. 2) Provide the Naval Tool Interoperability and Risk Assessment (NTIRA) tool-kit, to enhance Maritime Battle Center Joint Semi-Automated Forces (MBDJSAF); 3) Demonstrate the capability to test Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (CR4ISR) application in a multi-ship environment at sea using existing Systems Integration Environment (SIE). 4) Enhance production engineering simulation capabilities with the Virtual Shipboard and Lab Facilitator (VSLF).

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PROGRAM ELEMENT: 0308601N

PROGRAM ELEMENT TITLE: Modeling and Simulation Support

Project Number: R2222

Project Title: Modeling and
Simulation

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-03 Cost	FY-03 Award Date	FY-04 Cost	FY-04 Award Date	FY-05 Cost	FY-05 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Navy M&S Info Sys Development	Various	Various		1285	TBD	1197	TBD	1402	TBD	Cont.	Cont.	Cont.
Quality Assurance	Various	Various		756	TBD	705	TBD	825	TBD	Cont.	Cont.	Cont.
Subtotal Product Development				2041		1902		2227		Cont.	Cont.	Cont.
M&S Services	Various	Various		1286	TBD	1198	TBD	1402	TBD	Cont.	Cont.	Cont.
Subtotal Support				1286		1198	TBD	1402		Cont.	Cont.	Cont.
Simulation Experiments	Various	Various		2950	TBD	2747		3217		Cont.	Cont.	Cont.
Subtotal T&E				2950		2747		3217		Cont.	Cont.	Cont.
Engineering Studies/Analyses	Various	Various		1285	TBD	1197	TBD	1402	TBD	Cont.	Cont.	Cont.
Program Management												

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Project Title: Modeling and
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Subtotal Management				1285		1197		1402		Cont	Cont.	Cont.
Total Cost				7562		7044		8248		Cont	Cont.	Cont.

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* Not required for Budget Activities 1, 2, 3, and 6

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Exhibit R-4, Schedule Profile
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R-1 SHOPPING LIST - Item No. 210

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Exhibit R-4a, Schedule Detail
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