



**OPERATIONS COMMITTEE
SEPTEMBER 15, 2005**

**SUBJECT: UNIVERSAL FARE SYSTEM (UFS) REGIONAL
PROGRAM DEVELOPMENT FOR TRANSIT ACCESS PASS (TAP)**

**ACTION: AMEND CONTRACT TO BOOZ-ALLEN & HAMILTON (BAH) FOR
CONSULTING SERVICES**

RECOMMENDATION

Authorize the Chief Executive Officer to execute Amendment No. 7 to contract PS-4610-1026 with Booz Allen Hamilton (BAH) to provide continued technical implementation oversight of the Regional Universal Fare System / Transit Access Pass (UFS / TAP) Program in the amount not-to-exceed \$1,300,393, increasing the total contract value from \$7,724,857 to \$9,025,250.

RATIONALE

Additional contract authority in the current BAH/TAP UFS contract is required to continue technical oversight of the project through core system installation, testing and completion and covering the period of performance from baseline project acceptance to revenue service, with commencement of warranty.

In a prior recommendation from Foley & Lardner (outside legal counsel retained by the Board), BAH was designated as the technical oversight consultant assigned as a single point of accountability for the successful installation of the UFS equipment to ensure that the technical specifications they authored are implemented per the contract.

Tasks remaining to complete the UFS contract that require BAH technical oversight include:

- Completion of bus and rail in-service qualification pilot testing and review of test data at bus divisions 8, 9 & 15 and Pasadena Gold Line – cash/coin and smart card
- Completion of installation of remaining bus and rail equipment
- Completion of final installation testing – cash/coin and smart card
- Completion of Test Analysis and acceptance, and commencement of warranty – cash/coin and smart card
- Completion of Full Maintenance Phase (contingent on FTA approval)

DISCUSSION

To date, the UFS project has successfully completed and implemented:

- Pasadena Gold Line Ticket Vending Machines (TVMs)
- Completion of Conceptual, Preliminary and Final design of full functioning UFS devices
- Completion of First Article Configuration Testing, Network Integration Inspection and Testing
- Completion of bus operator, fare technician, and vaulter training and Closed Circuit Television (CCTV) operator training for revenue service operation at Divisions 8, 9 and 15 and Pasadena Gold Line
- UFS infrastructure installations at Divisions 1, 5, 10 and Metro Red, Blue and Green Lines
- In-Service Qualification Testing now in process at 3 divisions and Pasadena Gold Line
- Installation on-going to meet revenue operation date for Metro Orange Line (MOL)

Expanded scopes and delays in the project have caused reallocation of BAH resources and hours required to address new growths. Staff previously reported in the Monthly UFS/TAP Updates to the Operations Committee that contract modifications would be required for additional BAH technical support to ensure consistency and interoperability of new service and fleet types added since the original BAH scope of work approved by the Board on February 22, 2001. They are as follows:

- *Metro Orange Line installation oversight.* Equipment quantities and placement, engineering infrastructure requirements (different from either Metro light or heavy rail systems), and Cubic installation oversight based on Installation Acceptance Testing is a function required from BAH but not in their base contract since this project was not approved in 2000 when BAH's scope of work was developed. BAH will also be required to ensure that CCTV monitoring to the Bus Operations Control (BOC) center using UFS Cubic monitors are installed and operational, and that BOC operators are trained in accordance to the UFS operational manuals provided by Cubic. This functionality is new to BOC and mirrors the Rail Operations Control (ROC) center oversight of rail ticket vending machines for systems security and monitoring intrusion and equipment failures. BAH is responsible to ensure consistency in the contractor's deliverables which require that Cubic's Revenue Operations Service Desk respond to all Metro calls from BOC and ROC per UFS specifications to their "Open View" equipment.
- *Contracted Bus Service installation oversight.* At the time the BAH contract was approved, it was expected that existing contracted operators could be replaced through the competitive bid process which was to occur several years later. As evidenced by recent awards to new contracted operators, an entirely new installation plan for these operators are required that present 3 very different fleet types and garage infrastructures. BAH will be required to develop the technical specifications and provide technical oversight of individual installations to the buses and their garages which are each, different from each other or to Metro bus divisions. In

addition, BAH will be required to ensure systems integration to the Regional Central Computer now in design. After the completion of BAH's technical specifications, a change notice will be issued to Cubic to procure requisite equipment for these operators. They include receiver vaults, garage computers and telecommunications infrastructure. With Metro bus expansion and Consent Decree impacts, an equipment quantities analysis will be performed and recommendations will be presented to the Board before any change orders are issued to outfit the contracted service operators.

- *Metro bus expansion and Consent Decree impacts.* Since the award of BAH contract in 2001, Metro has expanded its fleet to include composite buses, 40' and 45' plus new 60' articulated buses. Each of these vehicle types requires modifications to Cubic's Bus Installation Plan. BAH is responsible to technically review all modifications which include integration and interfaces to the Advanced Transportation Management Systems (ATMS) system, monitoring engineering changes to fare box pedestals and connectivity to bus infrastructures and evaluating Cubic's proposed placement on board the vehicles which require hand rail modifications and other Corporate Safety corroboration. Since the UFS contract award, Metro has re-directed the installation of several existing fleet types, in addition to new vehicles, and BAH was required to provide the technical feasibility of changes to approved Cubic Bus Installation Plans. Ergonomic and safety issues presented by Division 9 pilot fare box installations required BAH oversight to ensure appropriate Cubic modifications. New mounting devices were needed from Cubic and BAH was required to write the technical specifications to effect this material change to the bus fare box.
- *Eastside and Exposition Line design oversight.* To date, BAH has been asked to identify equipment quantities for Eastside, and has been requested to review engineering design documents for Metro Construction. These items will be presented to the Board separately through the respective rail projects, and will ensure appropriate systems integration and technical oversight by BAH. These projects were not included in the 2001 BAH contract's scope of work. These additions are not inclusive of the current BAH amendment being requested.
- *UFS Design Changes* – There have been modifications to the UFS base contract for which BAH is responsible to provide the technical specifications for such changes, and ensure oversight through implementation. Examples include:
 - Re-design of base telecommunication systems – To reduce operating cost to Metro from using leased commercial telecommunication lines, the system was redesigned to use the newly installed fiber optic connection to USG, which was not available at the time the Cubic contract was awarded. This was a collaborative effort requiring BAH engineering expertise and Cubic re-design, testing and installation.
 - Design changes of UFS devices – TVM front panel design submittals from Cubic in the Conceptual Design Phase was revised at the direction of Metro to provide more user-friendly access to equipment. It included modifications to TVM bezels, adding live video feed to the Help Screens, installing variable messaging functionality, revising the graphic user interfaces, adding Electronic Benefit Transfer capability to accept Los Angeles County Social Service cards, and zip-

code verification for credit/debit functionality. Stand-alone validator capability was simplified from the contractual requirement, and installations at heavy rail and Metro Orange Line stations were modified to accommodate “virtual gate” placement using the existing validators. All of these design changes required BAH technical specifications to direct Cubic, and overseeing its design document modifications, testing and installation oversight as per new requirements.

- On bus fare box design, a material change in the UFS interface to the ATMS was required to work around radio frequency interference at bus divisions. Cubic defined how they would integrate to the ATMS equipment and BAH confirmed the technical feasibility and integrity of the recommended change. In addition, bus fare box driver control unit hardware was changed to accommodate safety and ergonomic issues raised by bus operators and Corporate Safety. Installations of fare boxes were revised at Corporate Safety direction on all Division 9 vehicles.
- In addition, Cubic has been delayed in the delivery of smart card functionality and integration to the Central Computer. This has impacted BAH since all systems integration testing and approval of Cubic’s deliverables require BAH oversight.

In addition, many significant changes and improvements can occur in new technology projects. To maximize the investment in smart card technology and to assess innovative options, additional technical analysis by BAH was requested. New equipment or alternatives were evaluated for potential integration to the UFS baseline contract. Cost and schedule impacts were developed for these options:

- Rear door boarding technical analysis
- On-board printer and Smart Card validator with enhanced driver control unit versus paper Smart Card - cost benefits analysis
- Virtual Gates vs. hard gates for heavy rail
- Conversion of Metro employee badges to dual technology (Smart Card & Proximity Card) successfully implemented introducing non-Cubic smart cards
- Off-board payment for Metro Rapid and UFS equipment to accommodate Metro Connections at regional and sub-regional operations

FINANCIAL IMPACT

The funding of \$1,300,393 for this contract amendment is included in the FY06 Budget in Project Number 200255 Universal Fare System, cost center 3020, Vehicle Technology. The UFS project is funded with a combination of Federal and local funds. This amendment is within the existing UFS life of project budget of \$93.6 million.

ALTERNATIVES CONSIDERED

Booz Allen Hamilton is designated by the Board as the UFS Program Implementation Manager and is responsible for ensuring that the contractor fulfills the requirements in the Technical Specification, which they authored to ensure the viability of the final product. To not have the technical oversight of BAH could potentially jeopardize the successful integration and implementation of the system now nearing completion and potentially place

in jeopardy the accountability of a single vendor who must ensure full and complete implementation and integration of this complex project.

NEXT STEPS

Near future needs:

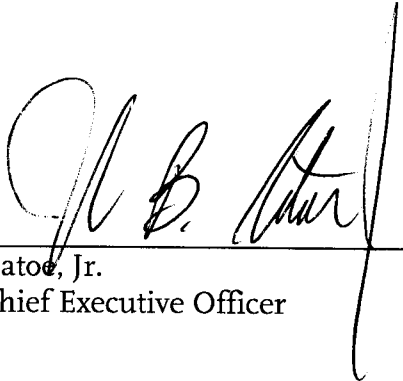
Staff will need to return to the Board at a future date with a proposal for life of project increase and funding of Booz Allen Hamilton's continued technical oversight of the following projects:

- Complete Booz Allen engineering oversight of Eastside equipment design, installation
- Complete Booz Allen engineering oversight and equipment quantities analysis for Exposition Line
- Metro Rapid Expansion and consideration of alternative off-board fare payment
- TAP Parking integrated into UFS/TAP smart cards
- Metrolink integration to UFS/TAP systems
- Other developing business application and program management and regional planning opportunities

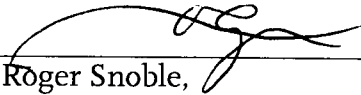
ATTACHMENTS

- A. Procurement Summary
- A-1 Procurement History
- A-2 List of Subcontractors
- B. Fact Sheet of UFS/TAP

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John B. Catoe, Jr.
Deputy Chief Executive Officer



Roger Snoble,
Chief Executive Officer

**BOARD REPORT ATTACHMENT A
PROCUREMENT SUMMARY**

**AMEND CONTRACT TO BOOZ-ALLEN & HAMILTON (BAH) FOR TECHNICAL DESIGN
AND IMPLEMENTATION OVERSIGHT**

1.	Contract Number: PS4610-1026		
2.	Recommended Vendor: Booz-Allen & Hamilton		
3.	Cost/Price Analysis Information:		
	A. Bid/Proposed Price: \$2,953,474	Recommended Price: \$1,300,393	
	B. Details of Significant Variances are in Attachment A-1.D		
4.	Contract Type:		
5.	Procurement Dates:		
	A. Issued: July 8, 2005		
	B. Advertised: N/A		
	C. Pre-proposal Conference: N/A		
	D. Proposals Due: July 8, 2005		
	E. Pre-Qualification Completed: N/A		
	F. Conflict of Interest Form Submitted to Ethics:		
6.	Small Business Participation:		
	A. Bid/Proposal Goal: 13.8 DBE Goal	Date Small Business Evaluation Completed: March 17, 2003	
	B. Small Business Commitment: 15.47% Details are in Attachment A-2		
7.	Invitation for Bid/Request for Proposal Data:		
	Notifications Sent: N/A	Bids/Proposals Picked up: N/A	Bids/Proposals Received: N/A
8.	Evaluation Information:		
	A. Bidders/Proposers Names: Booz-Allen & Hamilton	<u>Bid/Proposal Amount:</u> \$2,953,474	<u>Best and Final Offer Amount:</u> \$1,300,393
	B. Evaluation Methodology: Details are in Attachment A-1.C		
9.	Protest Information:		
	A. Protest Period End Date: N/A		
	B. Protest Receipt Date: N/A		
	C. Disposition of Protest Date: N/A		
10.	Contract Administrator: Don Dwyer	Telephone Number: 922-6387	
11.	Project Manager: Jane Matsumoto	Telephone Number: 922-3405	

**BOARD REPORT ATTACHMENT A-1
PROCUREMENT HISTORY**

**AMEND CONTRACT TO BOOZ-ALLEN & HAMILTON (BAH) FOR TECHNICAL DESIGN
AND IMPLEMENTATION OVERSIGHT**

A. Background on Contractor

Booz-Allen & Hamilton (BAH) has provided technical consultation to Metro on fare collection since the inception of the Metro's automated fare collection systems. BAH's involvement includes the drafting of the UFS technical specification, UFS implementation management services, technical oversight of the UFS Program and various studies related to fare collection. BAH is a recognized leader in the design and management of fare collection systems throughout the world.

B. Procurement Background

In February 2001, the Board approved a non-competitive contract with BAH for UFS Implementation Management Services.

Amendment No. 7: At the request of Metro, BAH submitted a proposal to provide additional technical support related to the following areas:

- Base Contract Additional Support through year ending 2009 to include:
- Metro Orange Line
- Contract Services

C. Evaluation of Proposals

A technical analysis was performed on the proposal received. The hours proposed and the distribution of labor is appropriate to the work and is determined to be technically acceptable.

D. Cost/Price Analysis Explanation of Variances

The recommended price has been determined to be fair and reasonable based upon cost analysis. Actual costs are subject to an incurred cost audit and may be adjusted based on audit findings.

**BOARD REPORT ATTACHMENT A-2
LIST OF SUBCONTRACTORS**

**AMEND CONTRACT TO BOOZ-ALLEN & HAMILTON (BAH) FOR TECHNICAL DESIGN
AND IMPLEMENTATION OVERSIGHT**

PRIME CONTRACTOR – Booz-Allen & Hamilton

Small Business Commitment

Other Subcontractors

Acumen Building Enterprise
LKG-CMC Inc.
EIGER TechSystems, Inc.

Total Commitment 15.47%

ATTACHMENT B

UFS FACT SHEET

Date of Board Action	Action Approved	Impacts
June 7, 1999	Board awarded a contract to Booz Allen Hamilton (BAH) in the amount of \$273,694 to prepare specifications for Universal Fare System (UFS) – compatible cash and electronic fare collection systems for the bus, rail and shuttle systems and for modifications to the SCRRA ticket vending machines (TVMs) to accommodate UFS transactions	As BAH commenced work on technical specifications for separate bus fare boxes and rail ticket vending machines (TVMs), the complication of integrating 2 separate proprietary systems became a concern to the Board. BAH was directed to take the 2 technical specifications for bus fare boxes and rail TVMs and combine them into one UFS specification and one procurement so that the integration of both systems became the responsibility of the contractor, not Metro.
May 25, 2000	Board approved the combined technical specifications for automatic fare collections equipment and authorized the Chief Executive Officer to issue the request for proposal for acquisition for the UFS equipment	At the time the request for proposals (RFP) was issued, the specifications required a magnetic-striped based UFS system, which was the industry standard at the time. However, after Metro Executive staff, Board members and their staffs toured several transit properties (Chicago Transit Authority and Washington Metropolitan Area Transit Authority), the benefits of a smart card based fare collection system over a magnetic system took hold.
February 22, 2001	Board approved the execution of a non-competitive cost reimbursable contract #PS-4610-1026 with Booz Allen Hamilton to provide consultant services for program implementation of the UFS project for a period of three and one-half (3 ½) years (April 9, 2001 – November 30, 2004) in an amount not to exceed \$4.5 million. This award was consistent with the advice provided by Foley & Lardner to maintain a single point of responsibility for the project. <i>Note: Foley & Lardner is an outside legal firm retained by County Counsel at the direction of the Board of Directors to support the UFS procurement</i>	Once the UFS equipment RFP was issued, the Board also ensured BAH continuity of technical oversight and implementing the specifications they authored. An outside legal firm, Foley & Lardner, was retained by County Counsel at the request of the Board to review and ensure the integrity of the technical specifications. Their review resulted in revisions to the technical language to protect the interests of Metro, and BAH revised and reissued the UFS RFP.
August 23, 2001	Board adopted Smart Card technology for the UFS and directed staff to proceed to best	A “Magnetic stripe vs. Smart Card Technology Analysis” was requested from BAH as a result of the Metro

	and final offers limited to Smart Card technology.	Executives and Board tour to several transit agencies (Chicago Transit Authority and Washington Metropolitan Area Transit Authority). In a comprehensive report accompanied by a UFS Workshop presented to the Board, the operational attributes and cost impacts of each system was presented. As a result of the smart card technology approved and adopted as the integrating regional fare media over magnetic stripe technology, BAH revised the technical specifications and the RFP was amended and reissued to the industry.
February 28, 2002	Board awarded \$89,003,444 contract # OP-02-4610-10 (inclusive of change orders allowance not to exceed \$5 million) to Cubic Transportation Systems for a Universal Fare System, effective March 1, 2002.	Conceptual and Preliminary design reviews commenced for (2) separate systems – first, the non-UFS ticket vending machines required meeting Pasadena Gold Line revenue operations date, and concurrently, the UFS smart card enabled system also was in design phases.
.August 19, 2002	Administrative re-negotiation of baseline schedule from 2-15-05 to 3-8-05.	The first major milestone to meet PGL revenue service was achieved on time and on budget, however, collateral impact to the UFS design process was occurring. UFS design changes as described on Page 3 of the Board report enumerates those changes. In recognition of such, a re-baseline of the schedule was affected.
January 23, 2003	Board approved Change Order No. 1 to Cubic Transportation Systems contract # OP-02-4610-10, increasing the contract value by \$7,454,844 to \$96,458,288 to procure ticket vending machines and stand-alone validators for the San Fernando Valley Bus Rapid Transit project.	As the SFV Metro Orange Line (MOL) project evolved to a fully funded project, analysis was required to evaluate the fare systems most appropriate to accommodate this new service. BAH met with the MOL engineering staff and project teams, and determined off-board payment, mimicking light-rail, as the preferred alternative. BAH provided the technical specification to procure ticket vending machines and stand-alone validators from Cubic. Review of MOL construction drawings, oversight of telecommunications infrastructure which is different from either Metro Light or Heavy Rail systems was required by BAH.

		<p>In the interim period of MOL design, the stand-alone validator installation scheme was altered to “virtual gate” format requiring BAH installation changes to the MOL contractor.</p> <p>Re-allocation of equipment quantities to accommodate the new Canoga Station Park & Ride and Warner Center stations required BAH analysis and oversight. BAH is currently in process of working with MOL staff to ensure UFS equipment installation and testing at the stations, plus Metro Bus Operations Control center to meet the revenue operations date. Such expanded resources was not anticipated in the original BAH contract.</p>
September 25, 2003	<p>Board approved Change Order No. 2 to Booz Allen Hamilton contract # PS-4610-1026, increasing the contract value by \$128,842 to \$4,705,185 to provide Phase I cost-benefits of various options to implement the UFS Regional Service Center and Clearinghouse, to include in-house versus outsourced alternatives related to current and new revenue functions.</p>	<p>As the Metro UFS equipment design was progressing, the Regional Municipal Operators’ equipment procurement and design of a regional smart card based system was concurrently occurring.</p> <p>A fully outsourced operation for regional smart card implementation was adopted and BAH is currently in the process of over-seeing its technical design and implementation with Metro and Munis.</p> <p>The regional branding of the smart card, Transit Access Pass (TAP) was adopted by the region through the BOS and Board.</p>
March 25, 2004	<p>Board approved Change Order No. 3 to Booz Allen Hamilton contract # PS-4610-1026, increasing the contract value by \$2,996,458 to \$7,701,643 to provide technical design, program development, and implementation oversight of the Regional Universal Fare System Program, and, approve a Life of Project budget of \$16 million for the implementation of the Regional Transit Access Pass (TAP) Clearinghouse and Service Center (\$16 million is inclusive of the Change Order No. 3 to BAH).</p>	<p>With the Board’s approval of a separate, regional Life-of-Project for TAP, BAH completed the technical specifications for the Cubic Regional Central Computer System, and separately, authored the technical specifications for the Regional Customer Service Center and Financial Clearinghouse which is being competitively bid.</p> <p>The RFP for the Customer Service Center/Financial Clearinghouse is now closed and the Source Selection process has commenced. BAH is responsible for the oversight of the technical analysis of submittals and assisting in the procurement process</p>

		to award contract.
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<p>October 28, 2004</p>	<p>Board approved contract Change Order No. 25 to Cubic Transportation Systems contract # OP-02-4610-10, increasing the contract value by \$6.1 million to \$98,949,312 to provide Municipal Operators/UFS Regional Central Data Computer System.</p>	<p>BAH was responsible to provide the technical feasibility of the Regional Municipal operator's back office system, and must now oversee the integration of this system with Metro's central computer to enable regional smart card processing and customer service applications. The Regional Central Computer is the backbone for TAP operations now being procured.</p>
<p>June 23, 2005</p>	<p>Board approved contract Change Order No. 28 to Cubic Transportation Systems contract # OP-02-4610-10, increasing the contract value by \$3,808,722 to \$102,015,153 to provide UFS equipment (ticket vending machines and stand-alone validators) for the use on the Metro Gold Line Eastside Extension Project</p>	<p>After the Eastside Extension project was approved, new rail ticket vending machines and stand alone validators were required.</p> <p>BAH is charged with overseeing its systems integration with the Eastside construction contractor, and through design and implementation, responsible for overseeing Cubic's testing and installation. This scope of work is NOT in staff's current request for the \$1.3 million BAH amendment, and will be brought forth to the Board by separate action by Metro Construction together with separate, similar needs identified for the Exposition Line. To date, BAH has provided limited analysis for equipment quantities. Currently, Construction staff is awaiting approval of BAH's design review from the Eastside contractor.</p>