FEDERAL TRANSIT ADMINISTRATION

PROJECT MANAGEMENT OVERSIGHT PROGRAM

Contract No. DTFT60-04-D-00013
Project No. DC-27-5041
Task Order No. 10

CLIN 0005: Spot Report
Project Cost Estimate Review

Grantee: City and County of Honolulu

Honolulu High-Capacity Transit Corridor Project

Project Cost Estimate Review

June 2009

FINAL DRAFT

By: **Booz Allen Hamilton**
8283 Greensboro Drive
McLean, VA 22102

TABLE OF CONTENTS

LIST OF ACRONYMS

AA	Alternatives Analysis
Booz Allen	Booz Allen Hamilton
CDT	Contract Document Transmittal
DB	Design-Build
DEIS	Draft Environmental Impact Statement
DTS	City and County of Honolulu Department of Transportation Services
EIS	Environmental Impact Statement
FD	Final Design
FEIS	Final Environmental Impact Statement
FFGA	Full Funding Grant Agreement
FTA	Federal Transit Administration
GEC	General Engineering Consultant
FY	Fiscal Year
GET	State of Hawai`i General Excise and Use Tax
HHCTC	Honolulu High-Capacity Transit Corridor (Project)
HDOT	State of Hawai`i Department of Transportation
LPA	Locally Preferred Alternative
MOS	Minimum Operating Segment
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
PB	PB Americas, Inc.
PDP	Project Development Plan
PE	Preliminary Engineering
PMO	Project Management Oversight
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PMSC	Project Management Support Consultant
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
ROD	Record of Decision
RTD	DTS Rapid Transit Division
SCC	Standard Cost Category
UH	University of Hawai`i
YOE	Year of Expenditure

1. Executive Summary

Booz Allen Hamilton (Booz Allen), as a Project Management Oversight Contractor (PMOC) under contract with the Federal Transit Administration (FTA), reviewed and assessed the Project Cost Estimate for the Honolulu High-Capacity Transit Corridor (HHCTC) Project submitted by the City and County of Honolulu (City) as of May 7, 2009. The May 7, 2009 Project Cost Estimate reflects the change to the Minimum Operating Segment (MOS) from the Salt Lake alignment option to the Airport alignment option.

The objective of the review was to evaluate if the May 7, 2009 HHCTC Expected Full Funding Grant Agreement (FFGA) Project Cost estimate is mechanically sound and is sufficiently developed at this Phase of the Project.

Overall, it is our professional opinion that the Expected FFGA Project Cost Estimate provided on May 7, 2009 is mechanically sound and acceptable as a Project Cost Estimate for this phase of the project.

The current Expected FFGA Project Cost estimate provided by the City on May 7, 2009 for the Airport Alignment option, excluding finance charges, is $4,268 million in Fiscal Year (FY) 2009 dollars and $4,942 million in Year of Expenditure (YOE) dollars. The anticipated finance charges for the Airport alignment is $231 million in YOE dollars, bringing the total expected FFGA cost of the project, including finance charges, to $5,173 million. Consistent with the FTA Guidance, these costs do not include estimated costs for Professional Services incurred prior to entry into Preliminary Engineering (PE), which is anticipated by the City for July 1, 2009.

Overall, the Expected FFGA Project Cost estimate for the HHCTC Project is found to be reasonable at this stage of the project. The provisions for contingencies were found to be adequate and appropriate for a project in the Pre-PE phase. Also, the assumed inflation rates used to adjust project costs from 2009 dollars to YOE dollars were found to be trending low and may not be sufficiently conservative, based on recent cost inflation for construction projects nationally and local Honolulu consumer cost inflation.

The Expected FFGA Project Cost estimate's level of detail is commensurate with a project at the Pre-PE phase. The estimate was prepared in accordance with generally accepted estimating principles and practices. Since the project is in the Pre-PE stage, major cost elements and risk items should be reviewed as the design and engineering mature and the construction schedule is refined. Such items include utility relocations, real estate acquisitions and right-of-way (ROW) considerations, environmental remediation, and geotechnical impacts to foundation design and construction.

2. Project Background/History

The HHCTC Project is a 29-mile, elevated fixed guideway system along O`ahu's south shore between Kapolei and the University of Hawai`i (UH) at Mānoa, including a spur to Waikīkī.

In July 2005, the state legislation authorized a 0.5-percent General Excise and Use Tax (GET) Surcharge as a source of revenue to build the transit corridor project. The GET surcharge went into effect on January 1, 2007 and has an end date of December 31, 2022. An Alternatives Analysis (AA) was initiated in August 2005 and the AA Report was presented to the Honolulu City Council in October 2006. Public meetings concerning the AA were held in November and December 2006, and on December 22, 2006, the City Council selected the fixed guideway alternative as the Locally Preferred Alternative (LPA). In selecting fixed guideway as the LPA, the City Council left some areas of the alignment open, which will be decided upon as the project progresses. These include West Kapolei, Salt Lake Boulevard versus Airport alignment, and the Waikīkī/UH at Mānoa branches.

On July 1, 2007, the City created the Rapid Transit Division (RTD) within the Department of Transportation Services (DTS) through enactment of the City's Fiscal Year 2008 Executive Operating Budget and Program. The RTD's responsibilities include project development, management and implementation. New staff members continue to be added to the City's organization within RTD and through InfraConsult, LLC (IC), the City's Project Management Support Consultant (PMSC). The City has started advertising the positions currently performed by IC.

On August 24, 2007, the City executed a General Engineering Consultant (GEC) contract for $85 million with PB Americas, Inc. (PB) to perform National Environmental Policy Act (NEPA) documentation and PE activities. The City combined the activities needed to support NEPA and to conduct PE into the GEC contract with separate Notices to Proceed (NTPs).

On April 17, 2008, the Mayor directed DTS to move forward with steel-wheel on steel-rail technology. On August 1, 2008, the City issued the Administrative DEIS to FTA for review and comment. The DEIS was completed and issued on October 30, 2008. The DEIS includes three fixed guideway build alternatives:

- Salt Lake only
- Airport only
- Airport and Salt Lake

The City requested entry into PE on May 4, 2009 and anticipates approval from the FTA by July 7, 2009.

In 2006, the City Council identified a 19-mile alignment from East Kapolei, through Salt Lake Boulevard and downtown, and with an eastern terminus at the Ala Moana (Shopping) Center as the selected MOS, which would be built first with the current funding/revenue available. The Project did not include the alignment from West Kapolei to East Kapolei, or from Ala Moana Center to Waikīkī or to the UH at Mānoa. However, on January 28, 2009 the City Council voted to revise the MOS alignment to the Airport alignment in lieu of the Salt Lake alignment.

The Airport alignment is approximately a 20-mile portion of the 29-mile LPA, extending from East Kapolei to Ala Moana Center via the Airport. The Airport alignment includes 21 stations. The alignment is elevated, except for an at-grade portion of 1,815 linear feet at the Leeward Community College station. The Airport alignment will average a total of 97,500 boardings at Revenue Operations in the year 2019, 116,000 boardings in the year 2030, and will provide two significant areas with potential for Transit Oriented Development, near the Airport and in the surrounding industrial areas.

It is anticipated that the initial fleet size will be 67 vehicles. There is currently no Full Funding Grant Agreement (FFGA) for this project. The Waipahu/Leeward Section, which is a 1-½-mile portion of the MOS between the Waipahu Transit Center and Leeward Community College Stations, will be the first section scheduled to be in limited operation at the end of 2012. Construction of the Waipahu/Leeward Section is scheduled to begin in April 2010.

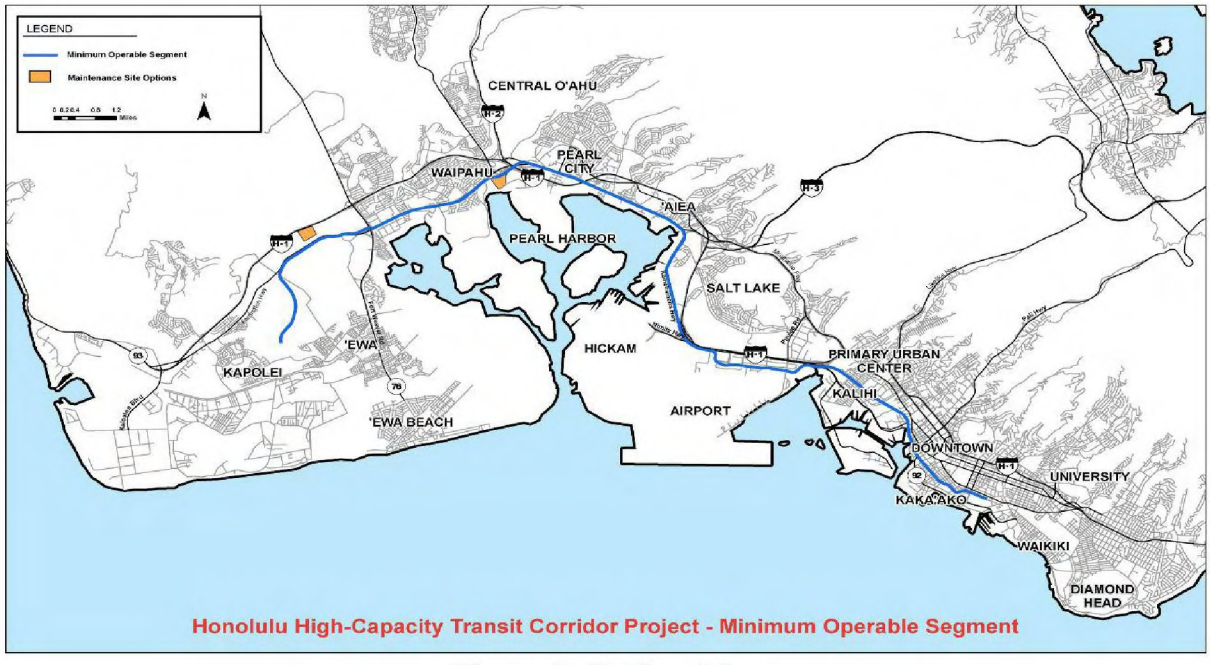

Figure 1. Project Map

3. Methodology

Booz Allen, as a PMOC, performed a preliminary review of the latest cost materials related to the Airport Alignment of the HHCTC Project, submitted by the City as of May 7, 2009. The purpose of the review is to:

- Assess the cost estimate for reasonableness for the project phase;
- Determine if the estimate is mechanically sound;
- Assess the estimating methodology and approach; and
- Identify inconsistencies or items in the estimate that may require additional review and/or revision.

The following files, provided by the City, were used by Booz Allen for this Expected FFGA Project Cost estimate review:

1. SCC Worksheet: HHCTC Airport Alignment FY 2009 (Main Worksheet – Build Alternative and Inflation Worksheet) [filename: *SCC Worksheet Airport Alignment FY2009$ 05-01-09.pdf*], dated May 1, 2009
2. HHCTC Modified AA Estimate Airport Alignment (Excel filename: *MU Airport Alignment 3-27-09.xls*), dated March 27, 2009
3. Reconciliation Spreadsheet *Capital Cost Reconciliation 19-May-09.xls* [which provides a reconciliation of the two files, *MU Airport Alignment 3-27-09.xls* and *SCC Worksheet Airport Alignment FY2009$ 05-01-09.pdf*]
4. Basis of Current Airport DEIS Estimate.

Booz Allen also referenced the following documents in its review:

1. Honolulu High-Capacity Transit Corridor Project – Financial Plan for Entry into Preliminary Engineering Submittal, dated May 1, 2009.
2. SCC Worksheet: HHCTC Airport Alignment FY 2008 (Main Worksheet – Build Alternative), dated March 27, 2009.
3. HHCTC Design Build (DB) Estimate, prepared by the General Engineering Consultant (GEC), dated October 2, 2008.
4. HHCTC Design Bid Build (DBB) Estimate, prepared by the GEC, dated October 2, 2008.
5. Subtask 33A: Parametric Project Cost Estimate Review – Section 6 of the HHCTC Spot Report – Final Draft, prepared by Jacobs, December 2008.
6. Appendix C of the HHCTC Spot Report – Final Draft, December 2008: SCC Worksheet: Salt Lake Alignment (Main Worksheet – Build Alternative), dated September 11, 2008.

4. Review and Assessment of Project Cost Estimate

Booz Allen notes that the methodology taken to develop the current HHCTCP Airport Alignment Expected FFGA Project Cost estimate is similar to the approach taken to generate the Salt Lake Alignment DEIS estimate.

The methodology for the Airport Alignment estimate[1] is as follows:

- The same estimate and quantities for Segments B, C, D, and E & G were used. (Booz Allen confirmed this through spot checks on the line items and quantities. However, Booz Allen also found that the following line item differs:
  - Segments E & G: Utility Modifications – Electrical and Communication (sub-study) - Dillingham-Nimitz-Halekauwila-Kapiolani: $193,469,182 (lump sum) for the Airport Alignment vs. $122,515,433 (lump sum) for the Salt Lake Alignment.
- The estimate for Segment F (Salt Lake Blvd.) was subtracted from the overall estimate. (Booz Allen confirmed that Segment F was not included in the Airport Alignment estimate).
- The estimate for Segment J (Airport) was added to the overall estimate (Booz Allen confirmed this).
- All the pricing for the direct costs was the same (Booz Allen confirmed that the unit pricing and line item pricing for the applicable segments were the same, except as noted above).
- All the indirect (soft costs) were calculated the same way (Booz Allen confirmed that the same percentages were used in both estimates for a particular soft cost).

Booz Allen noted the following differences in the May 7, 2009 Expected FFGA Project Cost estimate:

- There are 67 light metro rail (heavy rail) vehicles included in the Airport Alignment estimate, instead of 60[2] included in the Salt Lake Alignment estimate.
- A factor of 15% has been added to private utility costs for each segment to reflect the decision not to cost-share with those companies. This is consistent with the PMOC's comments made in the previous review process. (The PMOC notes that a 15% allowance was applied to utility modifications with no utility agreements in Segments B, C, J, and E&G. The 15% markup was not applied to utility modifications in Segment D.)
- There is a net reduction in ROW costs in changing from the Salt Lake Alignment to the Airport Alignment due to the fact that the Airport Alignment is primarily on public land with relatively reduced acquisition requirements. (The PMOC notes that ROW costs decreased from $137,662,191 [2008$] to $127,925,000 [2009$]).

---

[1] Taken from "Basis of Current Airport DEIS Estimate"

[2] The "Basis of Current Airport DEIS Estimate" states "65" vehicles, although "60" vehicles are reported in the Salt Lake Alignment SCC Worksheet (Main Worksheet – Build Alternative), dated Sept. 11, 2008.

- There are four stations on the Airport Alignment as opposed to two on the Salt Lake Alignment. One of those stations, the Aloha Stadium Station, has a center and side platform. However, the PMOC notes that the Aloha Stadium Station is shown only as a "side platform concourse" in the Project Management Plan – Rev. 2, March 1, 2009, Table 2, page 1-6. Thus, there is an inconsistency in platform type/layout for the Aloha Stadium Station, and Booz Allen questions whether this station's costs were adequately estimated.
- The Airport Alignment is approximately 1.22 miles longer.

Since the Airport Alignment FFGA estimate's methodology is basically the same as the Salt Lake Alignment DEIS estimate's methodology (except for the differences noted above) and since the supporting back-up for the Salt Lake Alignment estimate previously provided to the PMOC would apply to the Airport Alignment (except for Segment F), previous observations captured in the Cost Spot Report and Cost Validation Report would also apply. They include, but are not limited to:

- A sampling of the units cost in the Airport Alignment FFGA estimate indicated that the unit costs were the same in all segments of the Airport Alignment. Thus, the unit costs do not take into account varying site conditions along the alignment. Similarly, the estimate did not account for unforeseen site, ground, or geotechnical conditions.
- Station costs were based on generic line items and parametrically derived quantities and costs. Thus, the scope needs to be better defined to allow a more accurate portrayal of the station-related costs. This also applies to the four new stations on the Airport Alignment.
- The previous 2006 and current 2008 hazardous materials and environmental mitigation costs were lump sums, with minimum definition of scope. In order to develop a more accurate estimate of these hazmat/environmental costs, Booz Allen recommended in 2007 that a detailed site assessment be performed early in the PE Phase to better quantify the type, limits, and extent of any soil or groundwater contamination.

Booz Allen also previously identified these risks, which are relevant to the current Airport Alignment FFGA estimate:

- The availability and retention of labor, as well as the availability of materials and equipment, may adversely impact cost and schedule.
- Geotechnical information is not sufficient. Geotechnical and boring data is needed for the foundation design of structures.
- Real estate acquisitions are not completely known.
- Precast yards and laydown/staging areas need to be identified.
- Traction power supply and distribution requirements are not fully defined.
- Station communications and intelligent transportation systems need better definition.
- Fare collection system and equipment need better definition.

Booz Allen offers the following new and additional observations:

- **Stations – SCC 20**
  The Airport Alignment SCC Worksheet (dated March 27, 2009) shows a total of 21 stations, all aerial (SCC 20.02). However, the Leeward Community College Station is a proposed at-grade or slightly below grade station. This discrepancy was previously noted at the September 2008 Risk Assessment Workshop. It is unclear if the appropriate costs for an at-grade station at the Leeward Community College are now captured in the current Airport Alignment estimate.

- **Base Year Costs and Escalation**
  The HHCTCP Modified AA Estimate Airport Alignment cost estimate (filename: MU Airport Alignment 3-27-09.xls) states that "All costs are in Q1 2007 in the body of the estimate with adjustment to Q4 2007 at the summary level." That adjustment is a 3.65% escalation factor, which brings the total cost of the HHCTP to $4,283,695,200, in 4th Quarter 2007 dollars.

  By adjusting this $4,283,695,200 amount to reflect the reduction in vehicle fleet size from 69 to 67, the escalation to FY2009 dollars, and the subtraction of expenditures prior to FY2010, a revised base year total of $4,267,638,920 (2009$) is computed[3]. This amount does not include Finance Charges (which are calculated under SCC 100) and matches the Base Year Dollar Subtotal of SCC 10 through 90 given in the May 7, 2009 Project Cost Estimate (SCC Worksheet Airport Alignment FY2009$ 05-01-09.pdf).

- **YOE Estimate and Outyear Escalation**
  Booz Allen notes that Inflation Worksheet does not show the inflation rate and the compounded inflation factor for each outyear (i.e., FY 2010 through FY 2019). This information is typically presented above the "Year of Expenditure Dollars" row in columns corresponding to each YOE in order to facilitate the checking of the computations of the YOE dollars from the base year dollars.

  Furthermore, Booz Allen notes that it is unclear how the YOE dollars for SCC 10 through 50 and SCC 90 and 100 are calculated based on Exhibit 1: HHCTCP – Specific Cost Escalation Forecast (Table), which is found in the "Financial Plan for Entry into Preliminary Engineering Submittal." This Specific Cost Escalation Forecast table gives growth rates for estimate components (such as labor, steel, concrete, other materials, ROW, construction equipment, vehicles, and professional services) for each outyear.

  Specifically, it could not be determined how these specific component escalation rates were applied to SCC 10 through SCC 50, 90, and 100 (e.g., how was each component's escalation rate weighted to calculate the YOE dollars for SCC 10 through 50).

[3] Refer to the reconciliation spreadsheet *Capital Cost Reconciliation 19-May-09.xls*

The application of the escalation rates for ROW, Vehicles, and Professional Services, given in Exhibit 1, produced traceable YOE dollar amounts for SCC 60, 70, and 80, respectively, in the Inflation Worksheet. The escalation rates for Vehicles and Professional Services appear adequate, but are trending on the low end.

However, Booz Allen notes that there is de-escalation (or negative escalation) that has been applied to the base year dollars (2009$) for SCC 60 – ROW to calculate the YOE ROW amounts. In other words, the ROW costs in 2009 dollars are greater than the YOE dollars for ROW in FY2010, FY2011, and FY2012. This implies a downturn in the forecasts for property values along the alignment. Booz Allen recommends that the City should re-evaluate these property value decreases with consideration of the construction area, the project's alignment, and the complexities of the land acquisition process.

- **Financial Plan Costs vs. Project Estimate Costs**
  The May 1, 2009 Financial Plan and the May 7, 2009 Expected FFGA Project Cost estimate (SCC Worksheet) present different Project Costs since the Professional Services costs incurred in FYs 2007, 2008, and 2009 are only included in the Financial Plan. The Total Project Costs reflected in the Financial Plan and the May 7, 2009 Expected FFGA Project Cost estimate (SCC Worksheet) differ as follows:

Table 1. Project Cost Comparison

	May 2009 Financial Plan (Total Project Cost)		May 2009 SCC Worksheet (Expected FFGA Project Cost)	
	Millions 2009$	Millions YOE$	Millions 2009$	Millions YOE$
Cost Excluding Finance Charges	$4,330	$5,005	$4,268	$4,942
Cost Including Finance Charges		$5,318	$4,462	$5,173

The City notes, that consistent with FTA guidance, the Expected FFGA Project Cost estimate (SCC Worksheet) does not include costs estimated to be incurred before approval to enter PE, as these costs will not be included as part of the FFGA. Since the City assumes approval to enter PE on July 7, 2009 (the start of the City's FY 2010), the City has excluded Professional Services costs incurred in FYs 2007, 2008 and 2009 from the Expected FFGA Project Cost estimate (SCC Worksheet).

5. Conclusion

Booz Allen, as a PMOC under contract with the FTA, reviewed and assessed the Expected FFGA Project Cost estimate for the HHCTC Project submitted by the City as of May 7, 2009. The May 7, 2009 Expected FFGA Project Cost estimate reflects the change to the MOS from the Salt Lake alignment option to the Airport alignment option.

The objective of the review was to evaluate if the May 7, 2009 HHCTC Expected FFGA Project Cost estimate is mechanically sound and is sufficiently developed at this Phase of the Project.

Overall, it is our professional opinion that the Expected FFGA Project Cost Estimate provided on May 7, 2009 is mechanically sound and acceptable as a Project Cost Estimate for this phase of the project.

The current Expected FFGA Project Cost estimate provided by the City on May 7, 2009 for the Airport Alignment option, excluding finance charges, is $4,268 million in Fiscal Year (FY) 2009 dollars and $4,942 million in Year of Expenditure (YOE) dollars. The anticipated finance charges for the Airport alignment is $231 million in YOE dollars, bringing the total expected FFGA cost of the project, including finance charges, to $5,173 million. Consistent with the FTA Guidance, these costs do not include estimated costs for Professional Services incurred prior to entry into Preliminary Engineering (PE), which is anticipated by the City for July 1, 2009.

Overall, the Expected FFGA Project Cost estimate for the HHCTC Project is found to be reasonable at this stage of the project. The provisions for contingencies were found to be adequate and appropriate for a project in the Pre-PE phase. Also, the assumed inflation rates used to adjust project costs from 2009 dollars to YOE dollars were found to be trending low and may not be sufficiently conservative, based on recent cost inflation for construction projects nationally and local Honolulu consumer cost inflation.

The Expected FFGA Project Cost estimate's level of detail is commensurate with a project at the Pre-PE phase. The estimate was prepared in accordance with generally accepted estimating principles and practices. Since the project is in the Pre-PE stage, major cost elements and risk items should be reviewed as the design and engineering mature and the construction schedule is refined. Such items include utility relocations, real estate acquisitions and right-of-way (ROW) considerations, environmental remediation, and geotechnical impacts to foundation design and construction.