

PMOC REPORT

OP 33 – Capital Cost Estimate Review

**Honolulu Rail Transit Project
Honolulu Authority for Rapid Transportation (HART)
City and County of Honolulu
Honolulu, HI**

August 2012 (FINAL)

PMOC Contract Number: DTFT60-09-D-00012
Task Order Number 4: Programmatic
Work Order Number 12: Honolulu Risk Refresh
Project No. DC-27-5181
OPs Referenced: OP 33

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Length of Time Assigned: Five Years (November 18, 2009 through November 17, 2014)

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The Honolulu Authority for Rapid Transportation (HART) continues to advance development of its proposed Honolulu Rail Transit Project (“Project”), formerly known as the Honolulu High-Capacity Transit Corridor (HHCTC) Project, in accordance with the Federal Transit Administration (FTA) New Starts requirements. The Project is intended to provide improved mobility in the highly-congested east-west corridor along Oahu’s south shore between Kapolei and the Ala Moana Center. The Project would provide faster, more reliable public transportation services than those currently operating in mixed-flow traffic.

FTA assigned Jacobs as a Project Management Oversight Contractor (PMOC) on September 24, 2009, for the purpose of monitoring the Project and providing FTA with “information and well-grounded professional opinions regarding the reliability of the project scope, cost, and schedule” of the Project. That effort continues with this update report, which represents the PMOC’s assessment of the Capital Cost Estimate.

1.2 Project Description

The Project is an approximately-20-mile-long elevated fixed guideway rail system along Oahu’s south shore between East Kapolei and Ala Moana Center. The alignment is elevated, except for a 0.6-mile at-grade portion at the Leeward Community College station. The proposed investment includes 21 stations (20 aerial and 1 at-grade), 80 “light metro” rail transit vehicles, administrative/operations facilities, surface and structural parking, and maintenance facilities. The grantee plans to deliver the Project in four guideway segments:

- Segment I (West Oahu/Farrington Highway) – East Kapolei to Pearl Highlands (6 miles/7 stations)
- Segment II (Kamehameha Highway) – Pearl Highlands to Aloha Stadium (4 miles/2 stations)
- Segment III (Airport) – Aloha Stadium to Middle Street (5 miles/4 stations)
- Segment IV (City Center) – Middle Street to Ala Moana Center (4 miles/8 stations)

In a recently-announced change, HART has combined Segments III and IV into a single guideway construction contract. The Contract Packaging Plan has been updated to reflect this change.

Additional Project information:

- **Additional Facilities:** Maintenance and Storage Facility (MSF) and parking facilities
- **Vehicles:** 80 vehicles, supplied by the Core Systems Contractor (CSC), which is also responsible for systems design and construction and operations. The CSC is a Design-Build-Operate-Maintain (DBOM) contract.
- **Ridership Forecast:** Weekday boardings – 99,800 (2019); 114,300 (2030).
- **Target Revenue Service Date (RSD):** March 2019

1.3 PMOC Scope of Work

Under this Work Order, Jacobs is to provide the following deliverables:

- OP 32A: Project Transit Capacity Review
- OP 32C: Project Scope Review
- OP 32D: Project Delivery Method Review
- OP 33: Capital Cost Estimate Review
- OP 34: Project Schedule Review
- OP 40: Risk and Contingency Review

This report is limited to OP 33: Capital Cost Estimate Review.

1.4 Methodology

The PMOC followed the requirements outlined in the *FTA OP 33 – Capital Cost Estimate Review*, dated May 2010, to assess and evaluate the grantee’s cost estimate. Specifically, the review addresses:

- Soundness of the grantee’s cost estimating methods and processes compared with proven professional quantity surveying and cost estimating practices for projects of this scale
- Congruence of the project cost estimate with the project scope and schedule
- Reliability of the estimate for procurements, contract bids, and contract closeout

1.5 Summary of Findings

The PMOC evaluated the cost estimates within each Standard Cost Category (SCC) for mechanical soundness and consistency. These mechanical checks are used to determine the presence of material and calculation inaccuracies within the estimate line items. The *2012 SCC Estimate* dated May 15, 2012 was found to be mechanically correct in the tabulation of the unit cost, application of factors, and translation to the SCC workbook. The PMOC randomly sampled cost estimate line items to determine if the detailed backup “cross-walked” into the SCC workbook. In each instance, the PMOC found the calculated values translated to the SCC workbook and back to the cost estimate backup without variance or mechanical fault.

The estimate reflects Project phasing and sequencing as identified in the Master Project Schedule (MPS) and described in the Basis of Schedule. The schedule was used to calculate escalation at reasonable rates and for the durations contained in the MPS activity codes. The bids contain Year of Expenditure (YOE) escalation, so the grantee was able to develop base year and YOE costs mathematically for the 2012 SCC Estimate from a combination of bids and estimate values.

The PMOC did not find any significant discrepancies between the MPS and cost estimate line items within SCC or contract package Work Breakdown Structure (WBS). Furthermore, no significant issues were identified for missing scope or erroneous schedule durations.

The PMOC initially identified five (5) adjustments to the cost estimate, but these have now been incorporated into the most recent HART estimate (May 15, 2012) with the exception of an additive adjustment for “Contractor Markups” of \$15.24 million. The PMOC and HART could

not agree on the Contractor Markup issue at the workshop. The PMOC included the \$15.24 million additive adjustment in the OP40 Cost Risk Analysis. Subsequent to the April 2012 Risk Workshop, HART identified three (3) Cost Reduction Measures of \$68.75 million that were incorporated in the May 15, 2012 estimate revision and revised budget of \$5.12 billion.

The PMO reviewed the detailed Timberline and Cash Flow adjustments for the May 2012 cost reductions of \$68.7 million and found the adjustments to be mathematically correct. The PMO found it is reasonable to assume combining the remaining two large guideway contracts for City Center and the Airport will have some cost advantages and this accounts for \$27.5 million of the HART reductions. Many of the contract scope items were reduced by about 5% for this change and since the YOE contract value is \$819 million including contingency this seems okay. The reduction of \$2.8 million for elimination of an interim “opening day” is reasonable as well and affects mostly the startup cost category in SCC 80. The reduction for elimination of the remaining \$38.5 million is a straight percentage decrease of the remaining unspent SCC 80 soft costs and will take diligent management practices by HART to realize the reduction, but it is reasonable to assume this is an achievable goal.

HART provided a revised and complete SCC Workbook on June 20th 2012 for its final FFGA submittal with all tabs of the workbook included. This estimate version is essentially the same as the May 15th 2012 version except the cost of finance was reduced from \$177.2 million to \$173.058 million resulting in a final grantee YOE estimate of \$5,121,693,000.

1.6 Conclusion

The PMOC concludes that the Project is ready to submit an FFGA application with regard to the Capital Estimate (OP 33) assessment.

1.7 Recommendations

- (1) The grantee should incorporate the adjustment for the “Construction Markup” as identified during the PMOC Risk Assessment Workshop, which totals \$15.24 million (additive). The revised HART estimate of May 15, 2012 contains the Cost Reduction Measures and some of the proposed PMOC adjustments such as the Real Estate, GET Tax for Escalators/Elevators and Escalation recommendations. The PMOC included this adjustment in the OP40 Cost Risk Analysis as an adjustment to the grantee’s estimate.
- (2) The grantee should address any cost-related issues regarding slippage of Notice to Proceed (NTP) dates for the selected or awarded design-build contracts. The HART June 20, 2012 SCC Estimate, as supported by details in HART’s Cash Flow and as shown in Table 5 of this report, included \$89.6 million for pending change orders. This value includes some costs for potential delays. However, until these pending change orders become final, the cost is not set.
- (3) The grantee should continue to incorporate and implement the accepted VE proposals for the Stations and Airport/City Center segments.

- (4) The grantee should improve implementation of internal quality control and review of General Engineering Consultant (GEC) developed deliverables (cost estimates) prior to their issuance to the FTA/PMOC. The PMOC noted similar issues with the schedule and related project control deliverables as they lacked consistency with naming conventions, transmittal protocol, and incomplete information
- (5) The grantee should revise its staffing plan when major revisions are made to the Project scope, schedule or budget, or when major project phases are complete (e.g. completion of major DB contracts) in order to synchronize resource allocation planning. Major revisions include significant delay to contract letting or execution, contract package revisions, changes to contract delivery methods, etc., or the addition of professional service contracts, etc.
- (6) Oversight is needed for the implementation of professional services contracts to ensure that costs do not increase significantly during project development.

2.0 INTRODUCTION

The Honolulu Authority for Rapid Transportation (HART) continues to advance development of its proposed Honolulu Rail Transit Project (“Project”), formerly known as the Honolulu High-Capacity Transit Corridor (HHCTC) Project, in accordance with the Federal Transit Administration (FTA) New Starts requirements. The Project is intended to provide improved mobility in the highly-congested east-west corridor along Oahu’s south shore between Kapolei and the Ala Moana Center. The Project would provide faster, more reliable public transportation services than those currently operating in mixed-flow traffic.

FTA assigned Jacobs as a Project Management Oversight Contractor (PMOC) on September 24, 2009, for the purpose of monitoring the Project and providing FTA with “information and well-grounded professional opinions regarding the reliability of the project scope, cost, and schedule” of the Project. That effort continues with this update report, which represents the PMOC’s assessment of the Capital Cost Estimate.

2.1 Project Sponsor

The City and County of Honolulu (“City”) is the overarching FTA grantee. The City’s Department of Transportation Services (DTS) and HART have executed a Memorandum of Understanding, which delineates each agency’s roles and responsibilities so as not to jeopardize the City’s standing as an FTA grantee. HART is responsible for the New Starts grants for the Project and may share responsibilities with DTS for grants using Section 5307 or other FTA funding sources.

2.2 Project Description

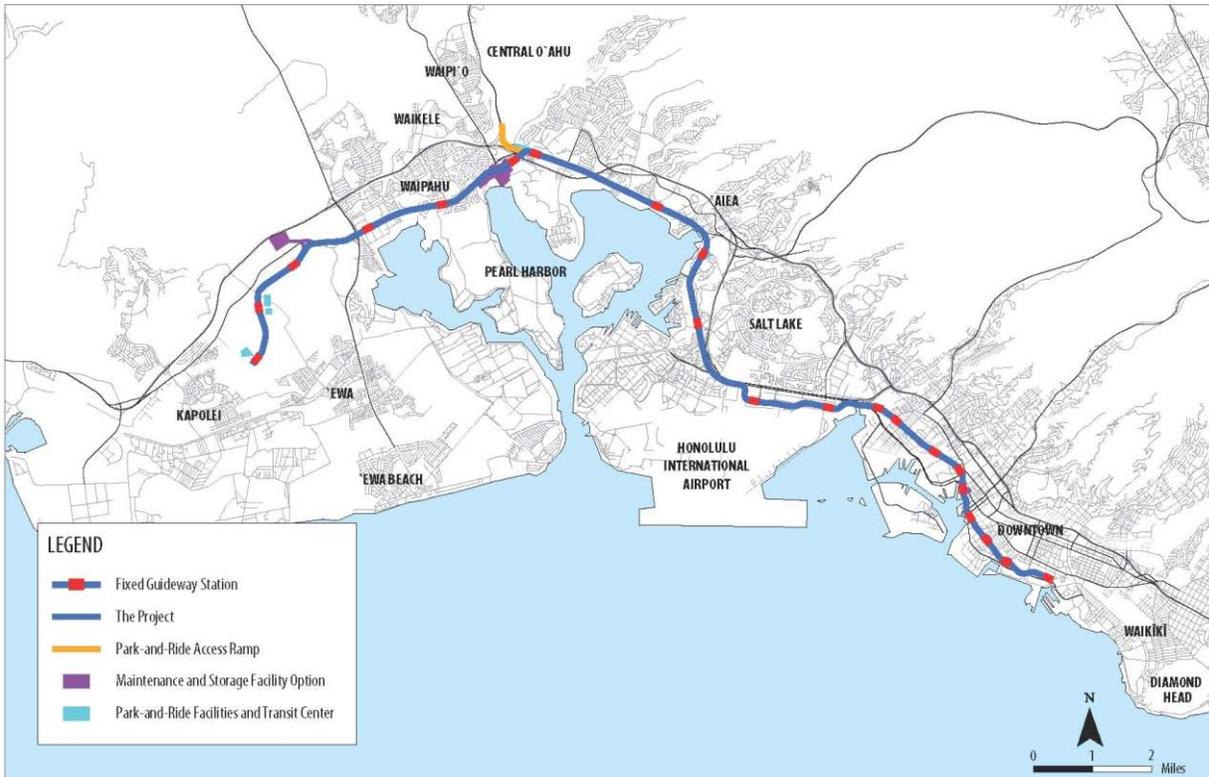
The proposed Project is a 20.5-mile light metro rail line in a grade-separated right-of-way that will provide high-capacity transit service on the island of Oahu from East Kapolei in the west to the Ala Moana Center in the east. The alignment is elevated except for a 0.6-mile at-grade portion adjacent to the Leeward Community College station. In addition to the guideway superstructure and trackwork, major physical elements of the Project include: 21 stations; one maintenance and storage facility; numerous right-of-way parcel acquisitions; and 80 light metro vehicles and associated core systems.

The Project is planned to be delivered in four design and construction segments:

- Segment I (West Oahu/Farrington Highway) – East Kapolei to Pearl Highlands (6 miles/7 stations)
- Segment II (Kamehameha Highway) – Pearl Highlands to Aloha Stadium (4 miles/2 stations)
- Segment III (Airport) – Aloha Stadium to Middle Street (5 miles/4 stations)
- Segment IV (City Center) – Middle Street to Ala Moana Center (4 miles/8 stations)

In a recently-announced change, HART has combined Segments III and IV into a single guideway construction contract. The Contract Packaging Plan has been updated to reflect this change.

Figure 1. Project as Identified in FEIS



East Kapolei is the western terminus of the Project. The alignment begins at North-South Road north of Kapolei Parkway. The alignment follows North-South Road in a northerly direction to Farrington Highway where it turns east following Farrington Highway and crosses Fort Weaver Road. The alignment is elevated along North-South Road and along Farrington Highway. The alignment continues in a north-easterly direction following Farrington Highway in an elevated structure. South of the H-1 Freeway, the alignment descends to grade as it runs alongside the Maintenance & Storage Facility at the former Navy Drum Site. The alignment continues at-grade to Leeward Community College and then returns to an elevated configuration to cross over the H-1 Freeway. North of the Freeway, the alignment turns eastward along Kamehameha Highway. Segment I includes seven stations: East Kapolei, University of Hawaii at West Oahu, Ho’opili, West Loch, Waipahu Transit Center, Leeward Community College and Pearl Highlands.

Segment II carries the alignment from Pearl Highlands to Aloha Stadium, running mostly above the median of Kamehameha Highway. At the highway interchange ‘Ewa of the stadium, the alignment crosses over to the mauka side of Kamehameha Highway, in land adjacent to the roadway that is currently used for stadium parking. Segment II includes two stations: Pearl Ridge and Aloha Stadium. East of Aloha Stadium Station, the segment features a third track for temporary train layovers or storage.

The Airport Segment, or Segment III, takes the alignment from Aloha Stadium to Middle Street. This entirely elevated section of the route starts on the mauka side of Kamehameha Highway, then transitions to the median of that street. As the route proceeds in the Koko Head direction, it leaves Kamehameha Highway to run on the makai side of the elevated H-1 Freeway. At Honolulu International Airport, the alignment swings out over the median of the H-1, then down Aolele Street to a station site adjacent to the main airport terminal. The route then continues Koko Head on Aolele and, eventually, the parallel Ualena Street to Lagoon Drive. At that point, the alignment crosses a corner of Ke'ehi Lagoon Park and threads through another highway interchange to Kamehameha Highway again at Middle Street. Segment III includes four stations: Pearl Harbor, Airport, Lagoon Drive, and Middle Street.

The City Center Segment, Segment IV, is also entirely-elevated as it carries the alignment from Middle Street to the Ala Moana Center. Segment IV features guideway structures above Dillingham Boulevard, Nimitz Highway, Halekauwila Street, Queen Street, and Kona Street. Above Kona Street at the Ala Moana Center Station, the segment includes tail tracks beyond the station to provide operational flexibility and storage. The segment includes eight stations: Kalihi, Kapalama, Iwilei, Chinatown, Downtown, Civic Center, Kaka'ako, and Ala Moana.

The Project also includes one Maintenance & Storage Facility (MSF), two park and ride lots, one park and ride structure and two bus transit centers. The rail vehicles will be fully-automatic and driverless.

The anticipated weekday boardings for the line are as follows:

- 99,800 (2019)
- 114,300 (2030)

2.3 Project Status

A Locally Preferred Alternative (LPA) was adopted in July 2008. The grantee was provided approval to begin Preliminary Engineering (PE) on October 16, 2009. The Final Environmental Impact Statement (FEIS) was published on June 25, 2010, and a Record of Decision (ROD) was issued on January 18, 2011. FTA granted approval to enter Final Design on December 29, 2011. The grantee is preparing an application for a Full Funding Grant Agreement in accordance with the FTA New Starts requirements.

2.4 Project Budget

The grantee's Base Cost Estimate (BCE) dated June 2012 is \$5.122 billion in Year-of-Expenditure (YOE) dollars, including \$644 million in allocated and unallocated contingency and \$173 million in financing costs.

2.5 Project Schedule

Table 1 presents the grantee's target dates for key milestones of this New Starts Project as identified in its Master Project Schedule.

Table 1. Target Milestone Dates

Milestone Description	Grantee Target Date
FTA Award Full Funding Grant Agreement	06-Oct-12
WOFH/KH Revenue Service	29-Jun-16
Airport/City Center Revenue Service (RSD)	12-Mar-19

Note: MPS Data Date of March 30, 2012

2.6 Project Management Oversight Contractor (PMOC)

Under this Work Order, Jacobs is to provide the following deliverables:

- OP 32A: Project Transit Capacity Review
- OP 32C: Project Scope Review
- OP 32D: Project Delivery Method Review
- OP 33: Capital Cost Estimate Review
- OP 34: Project Schedule Review
- OP 40: Risk and Contingency Review

This report is limited to OP 33: Capital Cost Estimate Review.

2.7 Evaluation Team

The following table presents the PMOC Evaluation Team and the respective roles associated with the assessment of the Project.

Table 2. PMOC Evaluation Team

Name	Location	Role
Jacobs		
Tim Mantych	St. Louis, MO	Program Manager
Bill Tsiforas	Las Vegas, NV	Task Order Manager
Keith Konradi	St. Louis, MO	Rail Engineering
Bob Niemietz	St. Louis, MO	Structural Engineering
Ahmad Hasan	St. Louis, MO	Geotechnical Engineering
Allan Zreet	Dallas, TX	Architect
Charles Neathery	Dallas, TX	Construction Management, Project Controls, Schedule Risk Assessment
Tim Morris	Dallas, TX	Cost Estimating
Brian Carpenter	Dallas, TX	Cost Estimating, Scheduling
Steve Renschen	St. Louis, MO	Cost Estimating
Albert Amos	Austin, TX	Economics
David Nelson	Boston, MA	Operations, Transit Capacity
Tracey Lober	St. Louis, MO	QA/QC
Joe Leindecker	St. Louis, MO	Planning
Virginkar and Associates, Inc.		
Arun Virginkar	Brea, CA	Vehicle Engineer, Buy America
Hal Edris	Spring Grove, PA	Systems Integration Manager
Triunity Engineering Management Inc.		
Jonnie Thomas	Denver, CO	Systems (Communications)
Interactive Elements Inc.		
Dennis Newman	New York, NY	Safety
Dorothy Schulz	New York, NY	Security
LS Gallegos Inc.		
JR Casner	Centennial, CO	Construction Management, QA/QC
OR Colan & Associates		
Bob Merryman	St. Louis, MO	Real Estate
Kowalenko Consulting Group Inc.		
Emma Kowalenko	Chicago, IL	Planning/Environmental
Independent Contractor		
David Sillars	Corvallis, OR	Risk Manager

2.8 Documents Reviewed

Appendix B provides a listing of the project-related documents that were utilized during development of this PMOC Report.

3.0 OP 33: CAPITAL COST ESTIMATE REVIEW

3.1 Introduction

3.1.1 Purpose and Objectives

Per the current Federal Transit Administration (FTA) Oversight Procedure (OP) 33, the following statements concisely state the focus of the PMOC's review of the grantee's 2012 *Standard Cost Category (SCC) Estimate* for FFGA:

- (1) ***Soundness of the grantee's cost estimating methods and processes compared with proven professional quantity surveying and cost estimating practices for projects of this scale:***

The grantee's 2012 *SCC Estimate* was prepared utilizing standard industry practices and tools such as Timberline estimating software and cost data base. The estimate contains normalized pricing from actual costs incurred on the project in part from bid results, executed contracts and several real estate parcel purchases in 2010, 2011 and 2012. The \$2.51 billion in aggregate contract value awarded to date is approximately 52% of the project's contract value, not including unallocated contingency. Table 15 provides awarded contract values.

- (2) ***Congruence of the project cost estimate with the project scope and schedule, i.e. do these three elements fully reflect each other?***

The grantee's estimate is reflective of the environmental documents and the project scope. As a result of performing the FTA OP 34 Project Schedule Review, the PMOC found the Master Project Schedule (MPS) to be mechanically sound but lacking in detail to sufficiently address all topics within the OP 34 review. However, the estimate is reflective of the sequencing identified in the MPS. The schedule was used to calculate escalation at reasonable rates and for the durations contained in the MPS activity codes. The bids contain Year of Expenditure (YOE) escalation, so the grantee was able to develop base year and YOE costs mathematically for the 2012 *SCC Estimate* from a combination of bids and estimate values. The Grantee used escalation rates for various commodities for all un-awarded contracts from the 2011 Risk Assessment as agreed to between the PMOC and HART (See Table 21). The PMOC verified these rates were included in the May 15th Cash Flow Excel File the grantee utilized to calculate escalation.

As noted above, 52% of the 2012 *SCC Estimate* value is associated with awarded design build Contracts or Design-only contracts. The remaining estimate value is based on Final Design (FD) documents which were reviewed by the PMOC in support of OP 32C review (conformance with environmental documents). The PMOC reviewed the Basis of Cost Estimate and the Basis of Schedule to verify transparency and traceability of assumptions used to justify the costs and durations associated with each Project scope element and SCC.

The work scope, the schedule, and estimate are coordinated and fully integrated with the exception of the adjustments identified within this report.

(3) ***Reliability of the estimate for procurements, contract bids, and contract closeout, i.e. will the project budget prove to be adequate at these milestone events?***

The grantee's engineer's estimates have proven reliable as they fall within range of previously let projects and awarded contract amounts. The engineer's estimates for the remaining Design/Bid/Build (DBB) contracts have been slightly adjusted to match the unit prices derived from the successful design-build (DB) and other contract bids. In some cases, the unit prices were not changed to reflect bid prices, as the site-specific nature of the work may dictate that higher or lower prices should be utilized. Caution should be exercised though since the inclusion of known delay claim costs, and potentially unknown delay claim costs, may not be fully accounted for in the estimate. The HART June 20, 2012 SCC Estimate, as supported by details in HART's Cash Flow and as shown in Table 5 of this report, included \$89.6 million for pending change orders. This value includes some costs for potential delays, but until these pending change orders become final, the cost is not set. It should be noted that the cost risk analysis assumes some unknown costs for delays are expected to be covered by contingency.

The FTA's objective is to assess the consistency of cost estimating information, understand its characteristics, and confirm that the estimate adequately reflects the overall project scope, estimating quantities shown on the design documents, the anticipated market conditions, and the project schedule.

The PMOC assessed the integration and traceability of the estimate into the defined scope of the project for the purposes of "baselining" the project estimate as the costs, scope issues and project become more fully defined and developed through progression of project definition. Using the data developed from this analysis, the PMOC made adjustments to the grantee cost estimate for use in the OP 40 (Risk and Contingency Review). These adjustments included scope items as well as a value for grantee identified escalation and contractor markups.

The PMOC reviewed and evaluated the general uniformity of the grantee's escalation from base year to YOY dollars, the escalation factors used, and the soundness of the economic forecasts and escalation factors. This is presented in greater detail in the escalation portion of the report.

3.1.2 Format, Date, and Level of Design

The grantee's 2012 SCC Estimate was prepared utilizing Timberline estimating software that the PMOC imported into a flat-file Excel format for analysis purposes.

The PMOC initially received draft Estimates from the grantee in November and December 2010. These two draft Estimates were based on 2010 dollars and matched the original PE budget of \$5.348 billion in YOY. The PMOC received an updated version of the grantee's Estimate on March 25, 2011 (2011 dollars with YOY total \$5,213 billion) in support of the grantee's request to enter the final design phase. This preliminary engineering cost estimate included \$865.58

million in allocated and unallocated contingencies and \$230 million in finance costs (revised from an initial \$180 million projection). The PMO performed a Risk Assessment and adjusted the estimate by \$101 million dollars. The FTA approved entry into the final design phase in December 2011.

HART is currently performing the necessary tasks and developing final documents in support of submitting an FFGA application. The PMOC used the grantee's March 19, 2012 cost estimate to initially perform the OP 33 analysis, in support of the FFGA application activities. A Risk Assessment workshop was held April 9, 2012 and the PMOC identified five cost estimate adjustments including a shortfall issue with the amount of contingency allocated for the Project. As a result of the preliminary Risk Assessment Workshop findings, HART provided additional documentation and eventually submitted several revisions to the Estimate. The latest Estimate, referred to as the *2012 SCC Estimate*, submitted to the PMOC on May 15, 2012 & revised June 20th, 2012 was used to perform the latest OP 33 review. Table 3 presents a summary of the *2012 SCC Estimate* in both base year and YOE dollars, including allocated and unallocated contingency amounts (for comparative purposes) based on the May 20th revision.

Three design-build and one DBOM (Core Systems contract) contracts are underway. The grantee is seeking an FFGA by the fall of 2012. The SCC 2012 Estimate includes level of designs ranging from PE level to 100% Final Design and is further supported with the inclusion of said awarded contracts. The Estimate also includes known potential and approved change orders from the executed contracts. The allocation of estimated costs is included within the base Estimate and not commingled with the Project contingency line items.

Table 3. 2012 SCC Estimate (based on June 20th, 2012 Final Revision)

SCC	Description	Base Year 2012\$		YOE \$	
		Total (Incl. Cont.)	Contingency	Total (Incl. Cont.)	Contingency
10	Guideway & Track Elements (Route Miles)	1,092,076,446	136,579,877	1,275,329,000	161,113,818
10.04	Guideway: Aerial structure	1,002,972,545	129,364,267	1,175,328,000	152,947,514
10.08	Guideway: Retained cut or fill	7,465,976	540,210	8,077,000	584,450
10.09	Track: Direct fixation	76,793,154	6,163,083	86,332,000	6,984,823
10.11	Track: Ballasted	3,129,501	226,439	3,551,000	256,910
10.12	Track: Special (switches, turnouts)	1,715,270	285,878	2,040,000	340,121
20	Stations, Stops, Terminals, Intermodals	421,425,022	70,237,503	506,166,000	84,360,947
20.01	At-grade station	6,629,965	1,104,994	7,334,000	1,222,266
20.02	Aerial station	293,834,730	48,972,455	353,476,000	58,912,691
20.06	Automobile parking multi-story structure	64,363,994	10,727,332	79,691,000	13,281,753
20.07	Elevators, escalators	56,596,333	9,432,722	65,665,000	10,944,237
30	Support Facilities: Yards, Shops, Admin.	91,336,297	6,326,082	99,425,000	6,890,443
30.02	Light Maintenance Facility	7,492,832	522,756	8,161,000	569,392
30.03	Heavy Maintenance Facility	37,610,679	2,577,783	40,907,000	2,807,751
30.04	Storage or Maintenance of Way Building	7,695,722	536,911	8,382,000	584,810
30.05	Yard and Yard Track	38,537,064	2,688,632	41,975,000	2,928,490
40	Sitework& Special Conditions	1,000,685,491	108,839,062	1,103,868,000	123,297,838
40.01	Demolition, Clearing, Earthwork	31,118,347	4,191,803	34,696,000	4,715,645
40.02	Site Utilities, Utility Relocation	320,732,033	46,300,710	350,695,000	51,245,046
40.03	Haz. mat'l, contam'd soil removal/ mitigation	6,692,100	584,980	7,229,000	638,393
40.04	Environmental mitigation	27,843,277	3,421,967	30,842,000	3,862,784
40.05	Site structures (retaining walls, sound walls)	8,032,572	593,102	8,638,000	638,622
40.06	Pedestrian / bike access, landscaping	40,733,318	6,034,675	48,263,000	7,188,919
40.07	Automobile, bus accessways (roads, parking)	181,951,581	25,698,743	212,536,000	30,556,812
40.08	Temporary Facilities/other indirect costs	383,582,263	22,013,082	410,969,000	24,451,617
50	Systems	210,366,785	22,162,982	247,461,000	26,176,478
50.01	Train control and signals	78,783,067	8,188,921	91,493,000	9,509,976
50.02	Traffic signals and crossing protection	10,075,327	1,660,906	12,524,000	2,065,784
50.03	Traction power supply: substations	27,587,822	2,827,158	32,874,000	3,373,007
50.04	Traction power distribution	31,872,050	3,061,436	36,426,000	3,548,136
50.05	Communications	50,131,734	5,185,899	59,889,000	6,197,895
50.06	Fare collection system and equipment	8,545,232	888,214	10,222,000	1,062,476
50.07	Central Control	3,371,553	350,448	4,033,000	419,204
	CONSTRUCTION SUBTOTAL (10 - 50)	2,815,890,043	344,145,506	3,232,248,150	401,839,524

SCC	Description	Base Year		YOE	
		Total (Incl. Cont.)	Contingency	Total (Incl. Cont.)	Contingency
60	ROW, Land, Existing Improvements	202,757,412	22,430,533	222,188,000	24,790,439
60.01	Purchase or lease of real estate	184,196,480	20,180,655	201,659,000	22,298,243
60.02	Relocation of existing households/businesses	18,560,932	2,249,878	20,529,000	2,492,196
70	Vehicles	178,117,419	18,513,997	208,501,000	21,672,166
70.01	Light Rail	159,357,816	16,564,074	186,061,000	19,339,681
70.06	Non-revenue vehicles	13,385,094	1,391,282	16,011,000	1,664,243
70.07	Spare parts	5,374,509	558,641	6,429,000	668,242
80	Professional Services	1,110,379,408	85,752,595	1,183,826,000	93,387,212
80.01	Preliminary Engineering	94,023,919	1,014,998	95,120,000	1,065,222
80.02	Final Design	247,054,153	28,305,213	257,935,000	29,613,276
80.03	Project Management for Design/Construction	369,968,567	18,069,269	385,826,000	19,367,231
80.04	Construction Administration & Management	200,941,494	16,574,749	218,156,000	18,499,024
80.05	Professional Liability/Non-Construction Ins.	44,707,726	4,786,257	52,138,000	5,588,306
80.06	Legal; Permits; Review Fees by other agencies	67,928,511	7,604,939	76,135,000	8,494,119
80.07	Surveys, Testing, Investigation, Inspection	23,229,214	2,970,847	24,955,000	3,195,992
80.08	Start up	62,525,824	6,426,323	73,561,000	7,564,042
	SUBTOTAL (10 - 80)	4,307,144,280	470,842,631	4,846,764,000	541,689,341
90	Unallocated Contingency	88,666,000	88,666,000	101,871,000	101,871,000
	SUBTOTAL (10 - 90)	4,395,810,000	559,508,631	4,948,635,000	643,560,341
100	Finance Charges	140,596,098	0	173,058,000	
	TOTAL PROJECT COST (10 - 100)	4,536,406,378	559,508,631	5,121,693,000	643,560,341

3.2 Grantee Submittals

Appendix B provides a listing of the project-related documents that were utilized during development of this Report.

3.3 Methodology

The following describes the PMOC methodology and approach for reviewing the grantee Estimate and performing the OP 33 Estimate Review.

The PMOC followed the requirements outlined in the *FTA OP 33: Capital Cost Estimate Review*, dated May, 2010 to assess and evaluate the grantee's cost estimate. Specifically, the PMOC completed a review of the project cost estimate "*2012 SCC Estimate*" to validate the following criteria:

- Procedures Review – Grantee's Cost Estimate Review Process
- Mechanically correct and complete
- Free of any material inaccuracies or incomplete data
- Consistent with relevant, identifiable industry or engineering practices
- Uniformly applied by the grantee's cost estimators and consistent in its method of calculation
- Consistent with the project scope outlined in the appropriate NEPA documents

The grantee's *Main Worksheet – Build Alternative* from the *SCC Workbook* was provided as Appendix C1 along with the previous version from 2009 and 2011. This Estimate was prepared by the grantee's General Engineering Consultant (GEC) with input from its sub-consultants. A significant amount of information used to evaluate this estimate is contained in other supporting project documentation made available to the PMOC, including those items identified in Appendix B of this report.

The grantee initially provided *only the estimate summary sheets* in SCC format and not *the standard SCC workbook* that will be required as a submittal for the FFGA. However on June 20, 2012 HART provided the final version of the SCC workbook that included all appropriate tabs. A series of "escalation" or "cash flow" sheets in Excel format were also provided. The summary sheets from the initial submittal did not utilize the standard formulas from the FTA Standard Escalation sheet, but they did document how escalation was calculated via a separate cash flow prepared in Excel format. In some cases, data values are "hard entered" and used to calculate the yearly escalation percentages. This is understandable as some of the YOE values were supplied by the awarded contractor's schedule of values, though not true in all cases.

Per Section 6.3 of OP 33, the PMOC approach in reviewing the project cost estimate should "regardless of the level of development of the estimate, provide FTA with reliable findings and recommendations". The PMOC determined a course of action for review and sampling once the cost estimate classification and characterization have been determined.

An important step in the PMOC's approach to reviewing project cost data is quantifying the volume of cost data available as well as identifying the type of estimate prepared by the grantee

(characterization). The PMOC used its best judgment and professional expertise to determine a sampling size for quantity and unit price review and, in some cases, determined other prudent approaches. The PMOC verified that all contracts (Awarded and Not Awarded) are included in the project budget are appropriately incorporated into the total. The PMOC also verified that correct escalatory adjustments and contingencies were applied and distributed across the applicable SCC line items.

Following is the PMOC's approach in reviewing the Project cost estimate as outlined in OP 33:

- (1) Review previous Risk Assessment analysis, adjustments and recommendations and verify these were addressed in the grantee's revised estimate(s).
- (2) Review drawings, specifications, environmental documents, Basis of Estimate, Contract Packaging Plan, Master Project Schedule, SCC Workbook, etc. to characterize the estimate.
- (3) Once the estimate characterization is complete, the PMOC determines whether a statistical approach (percentage basis) or more custom approach for sampling is most suitable. In the case of the Project, the PMOC first verified that the grantee accurately incorporated the awarded bids including change orders and then segregated the not awarded and awarded costs into separate categories.
- (4) A Pareto style analysis was used to identify the high cost drivers of the remaining un-awarded work. Specifically, the PMOC examined all line items exceeding \$200,000, the detailed costs for the stations, utilities, and cost for the Airport and City Center segments. The PMOC focused the review on items having the largest cost impact.
- (5) Review and determine validity of grantee's proposed adjustments from its internal Risk Assessment. Incorporate any significant findings from the OP 32C review as adjustments into the conditioned estimate.
- (6) Analyze the grantee's proposed individual escalation rates and the coordination of the escalated cost elements contained in the Master Project Schedule.
- (7) Verify the unit prices used in the Timberline Estimate as reasonable and check for adjustments or modifiers for differing conditions along the alignment and inclusion of General Conditions' elements. Sample quantities for un-awarded segment to verify number of stations, rail quantities, pre-cast segment length, etc. An example of this is the overall unit price for the remaining guideway sections in a dense urban setting is 50% higher than the two awarded westerly rural alignment Project segments.
- (8) Sampling to include a comparison of overall stations costs, unit prices for track and special trackwork, comparison of General Condition markups, verification of appropriate escalation, plus a check of unit prices in excess of \$200,000 and comparison of soft cost from the staffing plans against the Master Project Schedule.
- (9) Identify additional adjustments to condition the grantee's estimate for omitted or changed items.
- (10) Address all items listed in the OP 33 Appendix D checklist.
- (11) Identify "atypical" market forces such as remote geographic location, mega

project size, extended project life-cycle, and constrained urban setting.

3.3.1 Sampling

The PMOC first completed the estimate characterization to determine if an appropriate statistical analysis (percentage basis) or more custom approach for sampling was most suitable. The PMOC verified the grantee appropriately incorporated the awarded bids and performed a segregation of these line items from the Timberline Estimate into a separate category. The remaining, un-awarded, cost estimate line items were then exported from Timberline cost estimating software into a MS Excel spreadsheet so they could be sorted and analyzed with comparative ease.

The PMOC used a Pareto style approach for sampling of construction line item unit prices and quantities contained within the grantee’s Timberline estimate. The PMOC used the Excel spreadsheet to filter and develop a list of construction line items greater than \$200,000. The Timberline estimate contained 8,199 line items. The Pareto sampling technique resulted in a total of 1,128 line items containing a value greater than \$200,000. The total value of said line items accounts for more than 90 percent of the total Estimate amount.

Table 4. 2012 Sampling Table

Description	Approx. No. of Estimate Line Items	Value (\$)	% Based on Value	% Based on Line No.
All Line Items in Timberline				
Awarded Contracts	103	2,050,021,883	54.71%	1.26%
Soft Costs (not awarded)	44	265,705,468	7.09%	0.54%
Right of Way (ROW)	2	177,468,388	4.74%	0.02%
Guideway (Not Awarded)	1,684	570,705,369	15.23%	20.54%
Guideway Utilities (Not Awarded)	1,533	79,029,260	2.11%	18.70%
Stations (Not Awarded)	4,531	436,470,606	11.65%	55.26%
Utilities (not awarded)	190	120,183,020	3.21%	2.32%
Elev. & Escalators (not awarded)	112	47,163,602	1.26%	1.37%
Total of All Line Items	8,199	3,746,747,596	100%	100%
Sampled Items - (Construction Line Item Value >\$200K)				
Guideway Line Items	348	528,588,838	92.62 %	20.67 %
Guideway Utility Line Items	72	48,473,284	61.34 %	4.70 %
Station Line Items	412	265,655,468	60.86 %	9.09 %
Utility Line Items	46	114,731,660	95.46 %	24.21 %
Elevator/Escalator Line Items	112	47,163,602	100 %	100 %
Total of Sampled Items	990	1,004,612,852	59.21 %	12.23 %
Non-Sampled Items - (Construction Line Item Value <\$200K)				
Soft Cost Line Items	1	50,000	0.03 %	50.00 %
Guideway Line Items	1,336	42,116,531	7.38 %	79.33 %
Guideway Utility Line Items	1,461	30,555,976	38.66 %	95.3 %
Station Line Items	4,119	121,693,988	27.88 %	90.91 %
Utility Line Items	144	5,451,360	4.54 %	75.79 %
Elevator/Escalator Line Items	0	0	0.00 %	0.00 %
Awarded Line Items	10	569,211	0.03 %	9.71 %
Total of non-sampled items	7071	200,387,066	5.35 %	86.24 %

Note: Unit Prices are in 2012 Base Year. No contingency or Change Orders included.

The total value of \$3.75 million in Table 4 and Table 5 do not include some work elements. The following table demonstrates what is omitted.

Table 5. Calculation Proof

PROOF OF CALCULATION & TRACEABILITY	3,746,747,596
PEND'G CO'S ~DB-120, DB-200,DB-320,FD-240 &DBOM-920	89,554,050
SUBTOTAL (note: HART Cash Flow =\$3,836,301,649	3,836,301,646
ADD ALLOCATED CONTINGENCY (YOE\$)	541,689,342
ADD UNALLOCATED CONTINGENCY (YOE\$)	101,871,170
ADD ESCALATION (on all other Items but Contingency)	468,772,763
TOTAL	4,948,634,921
Cks: FROM HART SCC WORKBK MAY 15th 2012 BASE YEAR	4,948,634,920

The PMOC determined the grantee appropriately included Pending Change Order amounts previously identified in the Monthly Report. Although it is not clear why this value decreased from \$111.95 million (March 2012 Estimate) to \$89.55 million (May 2012 Estimate). The grantee has not yet provided reasonable explanation to the PMOC. However, the PMOC has begun implementation of detailed monthly reviews of Pending Change Orders. These reviews have been incorporated into a monthly meeting with the grantee to obtain the status of Project Controls.

The PMOC checked all of the unit costs in the “Greater than \$200,000” list as well as the 7,071 line items in the “Less than \$200,000 list”. Some issues were identified, but no significant costs impacts were found. The following table presents an example of the Timberline data (and level of detail) sampled for the Airport Guideway SCC. This table includes the following information for line items with a value greater than \$200,000:

- (1) SCC Designation
- (2) Quantity
- (3) Unit prices for labor and material and extensions (totals)
- (4) Overall Unit price to include labor, material, subcontract & other
- (5) Total line item price

Table 6. Timberline Data > \$200K for DBB-460 Airport Guideway

SCC	Description	Qty	Unit	Labor Unit	Labor Total	Mat'l. Unit	Mat'l. Total	Equip. Amount	Line Item Total	Unit Cost
10.04	Dewatering During Construction (minor)	60	mo						585,804	9,763.40
10.04	Temp stairway w handrail section average ht 50 ft	57	ea	659.20	37,794	3,164.04	181,404		219,198	3,823.24
10.04	Splice rebar, mechanical coupler, #11 bars	16,757	ea	22.00	368,650	19.71	330,248	2,339	701,237	41.85
10.04	Structural concrete, in place, elev slab, 4" slab, incl, finishing	53,918	sf	7.51	405,125	2.97	160,278	95,687	661,090	12.26
10.04	Elastomeric Bearings, 34in x 15in x 8 in	752	ea	435.44	327,454	1,994.68	1,499,996		1,827,450	2,430.12
10.04	ExpnJntassy, elast with studs & galvmtl plate cover	5,190	lf	14.50	75,241	74.94	388,944	16,183	619,962	119.45
10.04	Guideway Lighting	1	LS						2,740,277	2,740,277
10.04	Drill Shafts 8' Dia. (Inc. Install & Case)	12,424	vlf	868.37	10,788,674			6,724,812	17,513,486	1,409.65
10.04	Buy 4000 PSI Concrete	23,130	cy			183.94	4,254,574		4,254,574	183.94
10.04	Install Concrete (Tremie)	28,912	cy	7.76	224,316			148,559	372,875	12.90
10.04	Buy Concrete - Overbreak 4500 PSI-20%	5,782	cy			190.51	1,101,535		1,101,535	190.51
10.04	Buy Prefabricated Reinforcing Cages	4,819,566	lbs						4,834,287	1.00
10.04	Install Reinforcing & Lap Splice	311	ea	2,862.46	890,225			231,631	1,121,856	3,607.25
10.04	Radiograph Tubes	49,696	vlf	11.58	575,396	5.36	266,164	358,657	1,200,216	24.15
10.04	Drill Rig Movements	129	ea	3,473.49	448,081			279,298	727,379	5,638.60
10.04	Haul & On-site Disposal of Shaft Spoils	19,810	lcy	23.95	474,520			399,588	874,108	44.13
10.04	Casing Handling	199	ea	2,758.44	548,929			523,509	1,072,438	5,389.13
10.04	Site Casing Fabrication	199	ea	5,724.92	1,139,258			955,136	2,094,395	10,524.60
10.04	Purchase 9.5 ft. dia 1" thk. Casing	1,698,475	lbs			2.17	3,682,366		3,682,366	2.17
10.04	Place & Strip Forms, Columns	23,905	sf	8.91	213,023	2.97	71,062	54,790	338,874	14.18
10.04	Place & Strip Forms, Beam	48,882	sf	9.72	475,194	1.98	96,873	122,221	694,288	14.20
10.04	Formliner, Columns and Bent Cap	112,627	sf			2.31	260,400		260,400	2.31
10.04	Reinforcing in Place, Spread Footing	184,397	lb	0.71	130,956	0.79	146,344		277,300	1.50
10.04	Reinforcing in Place, Columns	2,501,863	lb	1.07	2,665,176	0.79	1,985,572		4,650,748	1.86
10.04	Reinforcing in Place, Beams	829,729	lb	0.95	785,681	0.79	658,504		1,444,185	1.74
10.04	Prestressing Steel, Grouted Strand	272,021	lb	4.91	1,334,924	2.75	748,405	28,946	2,112,275	7.77
10.04	Placing Concrete, Columns	9,526	cy	47.76	454,996	184.96	1,761,975	154,701	2,371,671	248.97
10.04	Placing Concrete, Beam	4,149	cy	77.62	322,028	184.96	767,419	109,491	1,198,938	288.97
10.04	Concrete Finishing, Vert Surface	198,205	sf	2.33	461,188	0.40	78,559	117,622	657,369	3.32
10.04	Concrete Finishing, Anti-Graffiti Coating	31,707	sf						209,272	6.60
10.04	Furnish Typical Pier/Expansion Joint Segment	2,229	ea						45,672,741	20,490.24
10.04	Furnish Balanced Cantilever Joint Segment	78	ea						3,196,477	40,980.48
10.04	Erect Typical Double Track Segment - Span by Span	1,885	ea	1,792.74	3,379,305			1,715,071	5,094,376	2,702.59

SCC	Description	Qty	Unit	Labor Unit	Labor Total	Mat'l. Unit	Mat'l. Total	Equip. Amount	Line Item Total	Unit Cost
10.04	Erect Pier/Expansion Joint Segment - Span by Span	344	ea	2,016.83	693,788			352,113	1,045,901	3,040.41
10.04	Buy Concrete Class V (6500 PSI) for Intrnl + Ext Diaphragms	4,087	cy			217.99	890,938		890,938	217.99
10.04	Form and Strip Internal & External Diaphragm Forms	94,256	sf	16.08	1,515,346			30,628	1,545,975	16.40
10.04	Form and Strip Blockouts in Diaphragms	17,200	sf	48.23	829,569	6.61	113,621	16,767	959,958	55.81
10.04	Pour & Cure Diaphragm	3,891	cy	118.83	462,322			168,175	630,497	162.06
10.04	Point, Patch & Whip Blast Structure	1,002,915	sf	1.16	1,166,851			156,578	1,323,429	1.32
10.04	Overtime (Labor and Equipment) for Erecting Precast Segments	1	LS	2,208,308	2,208,308	127,659	127,659		3,816,522	3,816,522
10.04	Overtime (Labor and Equipment) for Foundations	1	LS	4,220,434	4,220,434	132,243	132,243		4,818,118	4,818,118
10.04	Buy Forms - Closure Joint Steel Forms	17,640	sf			13.21	233,056		233,056	13.21
10.04	Build & Assemble Closure Joint Forms	17,640	sf	16.08	283,597			5,732	289,329	16.40
10.04	Form & Strip Closure Joint Forms	52,920	sf	48.23	2,552,372			51,589	2,603,961	49.21
10.04	Set & Strip Stem Walls	114,736	sf	9.65	1,106,765			22,370	1,129,135	9.84
10.04	Pour, Finish & Cure Closure Joint	2,492	cy	118.83	296,146			107,727	403,873	162.06
10.04	Pour, Finish & Cure Stem Walls	1,673	cy	118.83	198,830			72,327	271,156	162.06
10.04	Tie & Place Reinforcing Steel for Diaphragm (inc 5% for lap bars)	1,376,703	lb	0.06	88,099			34,742	1,522,491	1.11
10.04	Install, Stress & Grout Longitudinal Post-tensioning Steel	3,298,476	lb						18,739,899	5.68
10.04	Furnish PrecstConc Noise Barrier (\$15/sf plain) & (inc minor arch faciatrtmt \$15/sf)	172,536	sf			38.48	6,638,596		6,638,596	38.48
10.04	Install Precast Concrete Noise Barrier	43,134	LF	4.20	180,958			53,474	234,432	5.44
10.09	Unload Track Material & Distribute Along Line	52,241	tf	5.49	286,631			91,735	378,365	7.24
10.09	Electric (Flash Butt) Welding	1,206	ea	292.23	352,431			125,332	477,763	396.16
10.09	Place Running Rail with Fasteners (Temp. Supported)	52,241	tf	13.78	720,099			263,608	983,707	18.83
10.09	Raise, Shim & Align Rail	52,241	tf	11.03	576,079	2.58	134,877	210,886	921,842	17.65
10.12	No. 10 Double Crossover, DF	3	ea	132,328	396,984			145,325	542,309	180,770

3.3.2 Checking Costs Against Scope and Schedule

The estimate is based on the grantee's current final design drawings and design-build contract award amounts as of May 2012. The PMOC reviewed the remaining (un-awarded) line items according to contract packaging plan and SCC to verify scope inclusivity, inadvertent scope omissions, and potential doubling-up of scope among the various design document packages. The PMOC also referred to the MPS when performing the scope inclusivity review. The MPS is not yet cost loaded but will be in the near term and once this is completed it will contain a WBS that can be filtered and sorted to view all contract packages scheduling and cost information. The PMOC did not find any significant discrepancies between the MPS and cost estimate line items within SCC or contract package WBS sorts. Furthermore, no significant issues were identified for missing scope or erroneous schedule durations; detailed discussions are contained within the individual SCC portions of this report.

3.3.3 Identifying Allowances

The PMOC exported the cost estimate line items from the Timberline cost estimating software to MS Excel in an effort to identify all allowance amounts. The first sort filtered the various line item unit measures such as Lump Sum, Allowance, Each, etc. The PMOC used the information to effectively and efficiently support onsite workshop discussions with the grantee's project control and cost estimating staff in April 2012. In cases where the PMOC identified excessive cost amounts with Lump Sum unit measures, the grantee agreed to provide more detail and justification supporting the line item amount. This information was then incorporated into the Basis of Estimate. Further discussion on allowances is included in other report sections per the OP 33 guideline.

3.3.4 Identifying Patent and Latent Contingencies

The grantee specifically stated they avoid the use of patent or latent contingency in the cost estimate line items. The PMOC also verified GEC cost estimators noted the same intent to not use said contingency factors in the Timberline cost estimating software. The cost estimators said contingency was applied by upper management as an allocated percentage at the summary levels in HART's Cash Flow spreadsheet. The PMOC verified this was indeed the case.

Latent contingency is rarely identified in a cost estimate as it is associated with "hidden" cost to mostly account for an estimator's confidence level, or lack thereof stemming from insufficient information available at the time of developing the cost estimate. Other factors that contribute to latent contingency include project complexity, time or budget constraints to perform the cost estimate, limited quantity survey data, and technical "discipline" capacity limitations within the estimating team. Latent contingency is rarely recorded as it represents very subjective technical compensation factors which are purposely not disclosed. Many times, buried latent contingency produces "overly" conservative amounts for certain line items either difficult to quantify, highly specialized work, underground and utility work, real estate acquisition, and renovation work. The PMOC did not identify evidence supporting the presence of latent contingency.

The grantee performed an internal Risk Assessment update or refresh in the fourth quarter of 2011, and completed its analysis in final draft form in January 2012. The grantee included basis

of estimate and adequate documentation of the assumptions used to determine Project contingency in their March 19, 2012 Estimate. The Estimate included adjustments for Value Engineering cost reductions identified in the 3Q2011 and 4Q2011 for the Stations, Elevators & Escalators, Guideway Lights and Walkways. This reduction was previously submitted to the FTA and accepted as applicable to the project and is included in the revised 2012 estimate.

HART provided a revised estimate in May 2012 incorporating the VE cost reductions, some additional cost reductions for combining the City Center & Airport Guideways, eliminating one “interim opening” from the Core Systems DBOM contract and reductions in Soft Costs. The estimate also incorporated some of the PMOC cost adjustments from the April 2012 workshop such as escalation and GET revisions as well as incorporation of the changes from the modular station designs.

Patent contingency is appropriately accounted for in the cost estimate “Contingency” line items.

3.3.5 Accepting Grantee Cost

The PMOC reviewed the grantee’s proposed estimate that incorporated the VE cost reductions and the most recent Cost Saving proposals from the May 15th, 2012 estimate and as amended by the SCC workbook dated June 20, 2012 and accepted this as the base estimate prior to PMOC adjustments.

3.4 PMOC Review

3.4.1 Description of Structure, Quality, Level of Detail

Procedures – Grantee’s Cost Estimate Review Process

The PMOC reviewed the grantee’s PMP and companion documents, and related procedures in support of the OP 21 review and the grantee’s request to enter the Final Design phase. The PMOC met with the grantee to discuss its cost estimating procedure, “4.PC-06 Cost Estimating Procedure Rev 0 03.-10-11” and the Basis of Estimate as they both describe how cost estimates are developed, scrubbed and maintained. The Basis of Estimate describes all of the assumptions and parameters used to support and justify the cost estimate format and content.

The grantee has developed various procedures which address how project control deliverables are developed, revised, and reviewed according to internal quality control and quality assurance procedures. While the PMOC has not observed the grantee perform independent cost estimates or check estimates, the PMOC has verified that internal quality review procedures are intermittently performed. For example the PMOC has verified the grantee performs an internal review of the project schedules each time they are baselined and submitted to the Project team’s Change Control Board. While conducting the various OP reports, the PMOC has observed several gaps in the grantee’s internal quality assurance and quality control process as evidenced by inconsistencies with naming conventions, document control and transmittals, estimate reviewer disposition and revision history documentation. One of the main challenges is due to the continued issuance of multiple drawing revisions through the evolving process of preliminary engineering. The PMOC recommends the grantees improves its internal quality control implementation and possibly contract subject matter expert consultant services in order to meet

peak demands and critical milestone delivery dates.

Contract Packages and Estimating Approach

The cost estimate, Basis of Estimate, Master Project Schedule and Basis of Schedule consistently incorporate the work packages and WBS as described in the Contract Packaging Plan (CPP) which was reviewed several times by the PMOC. The CPP explains each work (contract) package and includes work elements, contract type, estimated value and other relevant information. Both the Project estimate and schedule can be organized and sorted by various contract packages in summary or detail level.

Coordination of Estimate with SCC

The PMOC reviewed the *2012 SCC Estimate* and supporting data provided by the grantee, which included information regarding civil, architectural, track work, utilities, vehicles, and systems components. The estimate is well organized and corresponds to the scope described in the Environmental Documents and Project Record Documents (engineering). The level of development of the estimate is more advanced than the PE review performed by the PMOC in 2011 and depends less heavily on unit measures: Allowances, Lump Sums, and CERs. A significant portion (52%) of the Project Estimate line items are based on unit pricing for work under contract and a significant portion of the remaining (not contracted) Project Estimate line include pricing data from the bids received to date.

The grantee recently prepared a more detailed Public Utility Estimate and a Right of Way Estimate, along with Staffing Plans for Soft Costs (SCC 80). The estimates strengthen the supportable documentation, confidence, and accuracy in the grantees Project Estimate.

The PMOC validated the grantee's methodology used to develop and assemble the Project Estimate. The PMOC did recommend the grantee revise prime contractor markup factors specific to certain SCC work packages and specialized subcontract work.

3.4.2 Market Conditions Survey

The PMOC included this section to supplement the cost estimate technical review and emphasize the contracts that have been awarded and how the unit prices were analyzed and applied across other sections of the cost estimate.

Honolulu has experienced the same sluggish economy as the rest of the county since the 2008 downturn and exacerbated to some extents as a result of the tsunami in Japan in 2011. The Honolulu unemployment rate recently hovers between 6.3 – 7 percent, less than the US mainland rate of 8.3 percent. The national average unemployment rate for the construction industry is approximately 16 percent. These rates are used as a comparable metric when evaluating and estimating unit pricing for various work packages.

So far the bids received to date favor the grantee as three of four awarded contracts were less than the grantee's Engineer's Estimate. Typically a sluggish economy favors a competitive bidding market which may benefit HART as it lets construction bids during the next twelve to twenty four months. Another factor that may offset the competitive bidding environment is the fact that one major prime contractor has three of the four contracts awarded to date so

mobilization costs for future work is minimal. This perceived advantage could quell competition and likely offset the favorable bidding climate. Conversely, the onsite prime contractor may increase future bids if they believe other contractors may not tender bids due to this monopoly perception. The grantee must continue to actively solicit bidders and structure construction packages to encourage competition.

The following sections provide a summary of the major contracts under award and PMOC response the OP 33 guideline review topics for each awarded contract.

Post Bid Analysis (49% of Packages Awarded)

The CPP indicates 69 planned procurement contracts for the subject program. Procurement of management, design and construction services began in the 3rd quarter of 2008 with the first award during the 4th quarter of 2009. Table 8 reflects the types of contracts identified in the CPP as well as the number of awarded contracts to date.

Table 7. Contract Package Delivery

Contract Package	No. of Planned Packages	No. Awarded to Date
Management Services (MM)	23	11
Final Design (FD)	10	3
Design-Build (DB)	3	3
Miscellaneous (CCH and HART)	12	12
Design-Bid-Build (DBB) & UTIL	13	0
Design-Build-Operate-Maintain (DBOM)	1	1
Manufacture and Install (MI)	1	0
Right of Way / Art / Private Utilities	3	0*
Programmatic Agreement	3	3
Total	69	33

*Multiple contracts combined in group work packages.

Table 8 reflects the significant contracts awarded to date including contract values. The general timeline of the procurement extends from the fourth quarter of 2009 until present day. More detailed information on procurement packages is included in the OP 32D – Project Delivery Method Review report. Base year dollar amounts were extracted from the May 25th, 2012 Project Estimates each depending on the contract award timeline. Total programmed YOE costs for each contract package are identified in the various SCC Workbook Summary Sheets provided to the PMOC. The Base Year Dollars – March 2011 or May 2012 Estimate (D) in Table 9 values reflect total construction cost less the assigned latent contingency values carried in each of the contracts as well as associated escalation. Contract proposals provided by the DB contractors include anticipated escalation cost, which is reflected in column (B).

Table 8. Awarded Contracts

Contract	Description	Base Year Total – May-12 Estimate (A)	Contract Value with Escalation (B)
DB-120	West Oahu /Farrington Highway Guideway DB	\$448,275,146	542,135,145
DB-200	Maintenance & Storage Facility DB	180,691,754	222,954,906
DB-320	Kamehameha Guideway DB	342,227,949	371,929,117
DBOM-920	Core Systems DBOM	493,991,673	579,648,486
	Construction Total	1,470,687,522	1,716,667,654
FD-240	Farrington Stations (3) Final Design	5,501,000	8,137,060
MM-900	PMC	20,000,000	20,000,000
MM-905	GEC I	76,910,382	76,910,382
MM-910	GEC II	300,892,731	310,828,630
	Professional Services Total	403,304,113	415,876,072

DB-120 West Oahu / Farrington Highway Guideway

- *Correlate and Analyze bids or proposal amounts against the estimated values for each bid or proposal. Assess the impact of each on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations:*

Table 9 reflects the DB-120 contract SCC totals in the March 2011 Project Estimate compared to the SCC totals identified in the October 10, 2010 Project Estimate provided by the grantee. Construction cost totals (B) calculated in the Timberline estimating software do not include breakout costs for escalation values included in the DB contract. The PMOC computed the escalation amounts and verified the total contract values were consistent with the proposal documents provided by the grantee.

Table 9. DB-120 West Oahu/Farrington Highway Guideway DB

SCC	Description	Construction Cost – 10-20-10 Estimate (A)	Construction Cost – DB Contract (B)	Escalation w/in DB Contract (C)	Total Contract Value (D)	Delta (B-A)	% Dev.
10.04	Guideway: Aerial structure	222,013,185	250,081,161	16,856,230	266,937,391	28,067,976	
10.08	Guideway: Retained cut or fill	7,187,912	6,037,951	398,570	6,436,521	-1,149,961	
10.09	Track: Direct fixation	17,042,333	13,903,349	1,900,999	15,804,348	-3,138,984	
10.11	Track: Ballasted	2,909,267	2,434,273	263,988	2,698,261	-474,994	
40.01	Demolition, Clearing, Earthwork	3,559,898	3,012,547	142,236	3,154,783	-547,351	
40.02	Site Utilities, Utility Relocation	32,160,850	28,887,142	861,989	29,739,131	-3,283,708	
40.04	Environmental mitigation	1,403,737	5,100,173	65,914	5,166,087	3,696,436	
40.05	Site structures (retaining walls, sound walls)	5,880,107	4,998,150	454,893	5,453,043	-881,957	

SCC	Description	Construction Cost – 10-20-10 Estimate (A)	Construction Cost – DB Contract (B)	Escalation w/in DB Contract (C)	Total Contract Value (D)	Delta (B-A)	% Dev.
40.06	Pedestrian / bike access, landscaping	1,671,919	1,372,311	178,123	1,550,434	-299,608	
40.07	Automobile, bus accessways (roads, parking)	13,528,541	11,535,056	1,010,162	12,545,218	-1,993,485	
40.08	Temporary Facilities/other indirect costs	97,435,721	88,628,963	376,255	89,005,218	-8,806,758	
80.01	Preliminary Engineering	28,707,421	31,524,898	183,797	31,708,695	2,817,477	
80.02	Final Design	21,107,030	11,909,069	817,018	12,726,087	-9,197,961	
	Total	454,607,921	459,415,043		482,925,218	4,807,122	1.06

The WOFH DB guideway contract was the first executed “construction” contract on the Project and occurred before the October 2010 Estimate was finalized. Planned costs indicate values removed from the majority of the SCC categories and incorporated into the Guideway Aerial Structure (SCC 10.04). The PMOC reviewed the impact of the awarded bid amount. The PMOC determined that awarded bid was within a reasonable range with no significant impact on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations.

- *Characterize and evaluate the grantee’s bid process (plan sets distributed, pre bid conference attendance, bid question activity, exit conference, telephone interviews, analytical products, bid tabulations:*

The subject contract was delivered under a two-part best value selection process. Potential contractors are invited to participate in the contracts Request for Proposal (RFP) followed by a sort listing of qualified contractors. The contractors then provide their proposal of services to the grantee in the second part of the contracting plan. The RFP was released in two parts. Part 1: September 2008 – March 2009 and Part 2: April 2009 – August 2009. The PMOC reviewed the grantee’s bid process and determined it to be acceptable and compliant with all requirements.

- *Where significant variances between bid received and estimates are discovered: Trace variances on bid tabulation elements back to the cost estimate and risk register:*

SCC estimate values for the DB-120 contract are represented by lump sum values in both the October 2010 and March 2011 Estimates and are not traceable as the bidders maintain their backup data is proprietary and confidential.

- *Sample unit cost and quantity information to evaluate the reliability of estimate compared with bid pricing; obtain independent market data and adjust as necessary to compare pricing and estimate. Sample scope elements from the contract documents to support conclusions;*

- *Develop an estimated allocation between unit cost and quantity variance;*
- *Organize causal factors into groups such as market factors, general conditions, risk transfers, etc.*

DB proposal documentation does not provide sufficient schedule of values breakdown to assess unit costs or estimated quantities. The four contract packages assessed within are design-build delivery contracts and the same comment is applied accordingly.

DB-200 Maintenance and Storage Facility

- *Correlate and Analyze bids or proposal amounts against the estimated values for each bid or proposal. Assess the impact of each on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations:*

The DB-200 contract SCC totals in the March 2011 estimate compared to the SCC totals identified in the October 10, 2010 Estimate are within 1.08% deviation of each other. Although the total values are rather close, SCC separate totals show significant deviations in cost.

Table 10. DB-200 Contract Values vs. Estimated Values

SCC	Description	Construction Cost – 10-20-10 Estimate (A)	Construction Cost – DB Contract (B)	Escalation w/in DB Contract (C)	Total Contract Value (D)	Delta (B-A)	% Dev.
10.09	Track: Direct fixation	11,987,183	35,658,458	4,760,126	40,418,584	23,761,275	
10.11	Track: Ballasted	426,761	0	0	0	-426,761	
10.12	Track: Special (switches, turnouts)	4,655,430	0	0	0	-4,655,430	
30.02	Light Maintenance Facility	9,112,802	6,968,204	563,654	7,531,858	-2,144,598	
30.03	Heavy Maintenance Facility	36,344,483	35,023,487	2,833,150	37,856,637	-1,320,996	
30.04	Maintenance of Way Building	7,258,175	7,156,889	579,394	7,736,283	-101,286	
30.05	Yard and Yard Track	70,208,166	35,806,244	2,931,809	38,738,053	-34,401,922	
40.06	Pedestrian / bike access, landscaping	6,077,412	1,648,275	196,857	1,845,132	-4,429,137	
40.07	Auto, bus accessways (roads, parking)	0	574,609	68,754	643,363	574,609	
40.08	Temp. facilities/other indirect costs	0	29,627,776	1,765,144	31,392,920	29,627,776	
50.03	Traction power supply: substations	0	1,055,557	132,939	1,188,496	1,055,557	
50.04	Traction power distr.	21,682,280	14,577,304	1,830,660	16,407,964	-7,104,976	
50.05	Communications	0	651,391	82,237	733,628	651,391	
80.02	Final Design	9,684,311	10,612,336	153,150	10,765,486	928,025	
	Total	177,437,003	179,360,530		195,258,405	1,923,527	1.08

The October 2010 Estimate contains more detail for scope elements, however, estimate detail reflected in the March 2011 Timberline file indicates many SCC totals as lump sum

values, making it difficult to fully correlate many line items. Redistribution of SCC costs appears to have been incorporated into the program cost estimate based on the proposal documents provided by the DB contractor.

The PMOC reviewed the DB proposed cost breakdown in order to identify discernment of SCC categories and scope items provided. Several SCC cost categories identified in the contractor breakdown of cost are not present in the grantee's SCC assignment, some of which include:

- Site Preparation, Subgrade Prep (SCC 40.01)
- Utilities, drainage and electrical (SCC 40.02)
- Train Control Duct Banks (SCC 50.01)
- Special Track (SCC 10.12)
- Roadway pavements, lighting, signals, signs and Painting (SCC 40.04)

Additionally, the contractor's proposal includes \$28.0 million in general requirements, public information and coordination activity that belongs in SCC 80.04, Construction Administration & Management. Although these costs are not categorized correctly, the estimate comparison of the total contract value and October 2010 Estimate value are very close. The PMOC determined that awarded bid was within a reasonable range with no significant impact on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations.

- *Characterize and evaluate the grantee's bid process (plan sets distributed, pre bid conference attendance, bid question activity, exit conference, telephone interviews, analytical products, bid tabulation):*

The two-part best value procurement process previously described was used for DB-200. Part 1: May 2009 – July 2009 and Part 2: July 2009 – February 2010. The PMOC reviewed the grantee's bid process and determined it to be acceptable and compliant with all requirements.

- *Where significant variances between bid received and estimates are discovered: Trace variances on bid tabulation elements back to the cost estimate and risk register:*

SCC Variances are due to misinterpretation of SCC coding by the grantee. Project Estimate total costs are based on contract values.

DB-320 Kamehameha Guideway

- *Correlate and Analyze bids or proposal amounts against the estimated values for each bid or proposal. Assess the impact of each on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations:*

Table 11 reflects the general contractor contract values (B) with the October 2010 estimated values (A). A deviation of \$94M (37.75%) between the two totals.

Table 11. DB-320 Kamehameha Guideway DB

SCC	Description	Construction Cost – 10-20-10 Estimate (A)	Construction Cost – DB Contract (B)	Escalation w/in DB Contract (C)	Total Contract Value (D)	Delta (B-A)	% Dev.
10.04	Guideway: Aerial structure	176,866,707	150,304,637	16,341,309	166,645,946	-26,562,070	
10.09	Track: Direct fixat.	3,111,766	9,145,882	1,337,902	10,483,784	6,034,116	
10.12	Track: Special (switches, turnouts)	410,634	0	0	0	-410,634	
40.01	Demolition, clearing, earthwork	926,744	6,090,296	646,640	6,736,936	5,163,552	
40.02	Site utilities, utility relocation	11,554,960	36,101,121	2,643,023	38,744,144	24,546,161	
40.02 ET	Site utilities, reloc, electrical, telecom	12,886,973	0	0	0	-12,886,973	
40.03	Hazardous material, contaminated soil, mitigation	457,970	5,060,962	440,840	5,501,802	4,602,992	
40.04	Environ. mitigation	2,334,240	5,417,133	455,840	5,872,973	3,082,893	
40.05	Site structures (retaining /sound walls)	1,194,400	1,392,528	154,319	1,546,847	198,128	
40.06	Pedestrian / bike access, landscaping	3,991,834	56,910	7,054	63,964	-3,934,924	
40.07	Auto, bus(roads, parking)	3,991,772	30,274,266	2,840,149	33,114,415	26,282,544	
40.08	Temp. facilities/other indirect costs	0	60,288,154	2,397,432	62,685,586	60,288,154	
50.02	Traffic signals and crossing protection	4,729,573	167,658	22,432	190,090	-4,561,915	
50.04	Traction power distr.	1,626,793	0	0	0	-1,626,793	
80.01	Prelim. engineering	9,945,262	38,883,020	1,680,043	40,563,063	28,937,758	
80.02	Final design	15,099,095	0	0	0	-15,099,095	
	Total	249,128,673	343,182,567		372,149,550	94,053,894	37.75

The contractor proposal was reviewed by the PMOC for accurate SCC cost category assignment prior to assessing deviations in cost. Although there were some category assignments not recommended by the reviewer, the majority of scope is properly assigned to the SCC listing.

Category costs were compared between the estimate and proposal values for significant deviations. The following SCC categories indicate where the difference in cost resides in the contract scope:

Table 12. Significant Cost Deviations by SCC

SCC	Description	Cost Over/Under
10.04	Guideway Aerial Structure	- \$14 M
40.01	Demolition, clearing, earthwork	+ \$5 M
40.02	Site utilities, utility relocation	+ \$12 M
40.03	Haz. mat'l., contam'd. soil removal/mitigation, ground water treatment	+ \$4 M
40.04	Environmental mitigation, e.g. wetlands, historical/archeological, parks	+ \$3 M
40.07	Automobile, bus, van access ways, including roads, parking lots	+ \$22 M
80.02	Final Design	+ \$28 M
80.04	Construction Administration & Management	+ \$35 M

90% of the cost overrun, or \$84M, is attributed to design, construction management and roadway construction. The PMOC determined that awarded bid was outside of the expected range. However, the grantee had sufficient contingency to cover the higher bid price with no significant impact on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations.

- *Characterize and evaluate the grantee’s bid process (plan sets distributed, pre bid conference attendance, bid question activity, exit conference, telephone interviews, analytical products, bid tabulations);*

The two-part best value procurement process previously described was used for DB-320. Part 1: November 2009 – January 2010 and Part 2: March 2010 – October 2010. The PMOC reviewed the grantee’s bid process and determined it to be acceptable and compliant with all requirements.

- *Where significant variances between bid received and estimates are discovered: Trace variances on bid tabulation elements back to the cost estimate and risk register:*

The grantee indicated in its post bid analysis, the unit prices/overall cost for the guideway were essentially accurate, but the bidder increased the design and construction management portions of the work. It is unclear if this is from front end loading or perception by the bidder the design costs are higher than the grantee estimated.

DBOM-920 Core Systems

- *Correlate and Analyze bids or proposal amounts against the estimated values for each bid or proposal. Assess the impact of each on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations:*

Table 13 reflects the October 2010 estimated systems costs with the contracted value stipulated in the contractor’s proposal. SCC totals reflected in column B have been significantly manipulated by the GEC in order to properly assess and distribute costs. The percent deviation between the estimated value and the contract value is less than the Kamehameha Highway contract difference; however, contract values are significantly higher.

Table 13. DBOM-920 Core Systems DBOM

SCC	Description	Construction Cost – 10-20-10 Estimate (A)	Construction Cost – DB Contract (B)	Escalation w/in DB Contract (C)	Total Contract Value (D)	Delta (B-A)	% Dev.
40.08	Temp. facilities/other indirect costs	0	90,105,505	14,249,852	104,355,357	90,105,505	
50.01	Train control and signals	88,115,474	69,022,693	13,656,771	82,679,464	-19,092,781	
50.03	Traction power supply: substations	49,598,420	23,116,064	5,864,293	28,980,357	-26,482,356	
50.04	Traction power distribution	14,460,559	9,358,987	2,264,228	11,623,215	-5,101,572	
50.05	Communications	29,762,979	43,266,061	10,103,582	53,369,643	13,503,082	
50.06	Fare collection system / equipment	16,379,469	7,484,269	1,733,588	9,217,857	-8,895,200	
50.07	Central Control	27,507,214	2,953,322	500,249	3,453,571	-24,553,892	
70.01	Light Rail	297,731,040	140,149,232	30,973,089	171,122,321	-157,581,808	
70.06	Non-revenue vehicles	11,858,634	11,824,978	1,201,808	13,026,786	-33,656	
70.07	Spare parts	3,651,521	4,748,075	800,139	5,548,214	1,096,554	
80.02	Final Design	44,453,057	41,689,676	1,522,824	43,212,500	-2,763,381	
80.08	Start up	52,717,879	40,044,195	7,149,555	47,193,750	-12,673,684	
	Total	636,236,246	483,763,057		573,783,037	-152,473,189	- 23.96

Category costs were compared between the estimate and proposal values for significant deviations. The following table presents the significant cost deviations by SCC.

Table 14. Significant Cost Deviations by SCC

SCC	Description	Cost Over/Under
40.08	Temporary facilities and other indirect costs during construction	+ \$90 M
50.01	Train control and signals	- \$20 M
50.03	Traction power supply: substations	- \$31 M
50.05	Communications	+ \$13 M
50.06	Fare collection system and equipment	- \$8 M
50.07	Central control	- \$24 M
70.01	Light Rail	- \$157 M
80.02	Final Design	- \$3 M
80.08	Start-up	- \$12 M

The systems contract proposal indicates \$90 million more than the budgeted amount for general requirements and management costs while the GEC costs include additional monies for train control, power and central control. The construction contractor most like front-end loaded the management and mobilization costs in order to enable a positive cash flow. The significant cost deviation exists in the procurement of the Light Rail Vehicles at \$157 million. The PMOC determined that awarded bid was less than

expected, and there was no significant impact on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations.

- *Characterize and evaluate the grantee's bid process (plan sets distributed, pre bid conference attendance, bid question activity, exit conference, telephone interviews, analytical products, bid tabulations):*

The two-part best value procurement process previously described was used for DBOM-920. Part 1: April 2009 – June 2009 and Part 2: August 2009 – January 2011. The PMOC reviewed the grantee's bid process and determined it to be acceptable and compliant with all requirements.

- *Where significant variances between bid received and estimates are discovered: Trace variances on bid tabulation elements back to the cost estimate and risk register:*

The Core Systems Contract (CSC) is a DBOM contract, with large material components, complex factory assemblies, complex train control, signaling & communications, including initial operations & maintenance. The contract period of performance is more than 10 years, and the precise method a contractor distributes costs on such a contract is not typically traceable. The successful bidder allocated lower cost for vehicles in its payment structure, which did not match the Engineers Estimate. This is not unusual, particularly since the proposed vehicle is in production for other transit properties. This was treated appropriately as a risk event and not an estimate adjustment.

3.4.3 Characterization or Stratification of Cost Items

The PMOC reviewed the grantee's *2012 SCC Estimate*, which correlates to the scope and values included in the Record of Decision (ROD) and Final Environmental Impact Statement (FEIS). The PMOC Cost Estimate Review consists of two primary functions: (1) review and evaluation of project scope inclusively, as identified in the Environmental Documents; and (2) characterization of the mechanical and fundamental soundness of the cost estimate. The PMOC review also includes an evaluation of the cost estimate source data and its use in the *2012 SCC Estimate*. The cost elements were also reviewed for accuracy and applicability to the project.

The cost estimate includes both a summary sheet and detailed backup in Timberline format for each SCC. The cost estimate criteria document describing the methodology used in developing the estimate was provided and is incorporated into the project estimates. The Basis of Estimate describes the assumptions that were made in developing the estimate. It does not describe integration with the project schedule or documentation of productivity, unit costs, indirect costs, or overhead and profit. Some of this relevant information is described in the contracting plan from a contract standpoint but not in a detail-oriented aspect.

The PMOC reviewed the detailed estimate sheets for the individual line items of each SCC and performed quantity spot checks on line items or quantities, as these are now directly traceable back to the Project documents.

The PMOC determined that the estimated length of the project to be 105,888 Route Feet, somewhat inconsistent with the value contained in the SCC Summary sheet of 106,095 feet. Previously, the 2011 Basis of Estimate in Appendix “B” noted a length of 105,880 RF, which is essentially equal to the PMOC calculation but the revised 2012 Basis of Estimate does not include the quantity length. This value was critical during the development of the original parametric estimate, as the cost units were based on this quantity for many calculations. This value is not as critical with the current bottoms-up detailed style estimate by the grantee because the estimate is based on individual cost elements and quantities for the various line segments.

The PMOC previously separated the 2011 SCC Cost Estimate into classifications as suggested by OP 33 to segregate cost into a range from least risky categories to more risky segregations, and for this estimate most of the work is of the least risky variety:

- Lump Sum (Most Risks)
- Cost Estimating Relationships (CER)
- Unit Costs (based on bottoms up style quantities)
- Awarded Contracts (due to DB approach for 43% of the work)

The PMOC prepared a Cost Estimate Classification Table (See Table 15) to distribute the project costs from the grantee’s Timberline cost estimating software (estimate). Since a large portion of the work is design-build, these values were segregated in the Cost Estimate Classification Table along with the standard FTA prescribed categories of “*Estimated Quantities, Cost Estimating Relationships (CER) and Allowances*”.

The estimate includes Lump Sum allowance line items for “*Allocated and Unallocated Contingencies*”, but does not readily identify latent contingency values but as noted above the PMOC does not find any indication latent values exist in the estimate. Table 16 summarizes the estimate into the chosen classification for the PE assessment of 2011. The allowances identified following this discussion were not included in the Cost Estimate Classification Table. These values are not true allowances and in the case of the 40.02 utility line items (\$46.0 million) lower level supporting detail was provided by the grantee and reviewed by the PMOC. The table below does not include PMOC adjustments.

The PMOC included a revision to this table even though no significant changes have occurred in the distribution other than some engineering contracts have been let. The new Table 15 shows the current distribution of the Timberline Estimate dated May 15, 2012. The Lump Sums were included in the distribution table as there is separate supporting detailed backup for these values and this list of allowances is analyzed elsewhere in this report.

Table 15. 2012 Cost Estimate Classification

SCC	Description	Qty.	UM	Bid/ Awarded (\$)	Unit Pricing (\$)	CER	LS/ Allowance	Total (\$)	SCC %
10	Guideway & Track Elements	20.05	RM	538,774,464	736,554,500	\$0	\$0	1,275,328,964	
10.04	Guideway: Aerial structure	19.45	RM	450,183,044	725,145,141			1,175,328,185	92.16
10.08	Guideway: Retained cut or fill	0.60	RM	8,077,393	0			8,077,393	0.63
10.09	Track: Direct fixation			76,963,393	9,368,635			86,332,028	6.77
10.11	Track: Ballasted			0	0			0	0
10.12	Track: Special (switches, turnouts)			3,550,634	2,040,724			5,591,358	0.44
	Percent of SCC10 Total			42.25 %	57.75 %	0%	0%	100 %	100%
20	Stations, Stops, Terminals, Intermodals	21.00	EA	0	506,165,690	\$0	\$0	506,165,690	
20.01	At-grade station	1.00	EA	0	7,333,599			7,333,599	1.45
20.02	Aerial station	20.00	EA	0	353,476,149			353,476,149	69.83
20.06	Automobile parking multi-story structure			0	79,690,518			79,690,518	15.74
20.07	Elevators, escalators			0	65,665,424			65,665,424	12.97
	Percent of SCC 20 Total			0.00 %	100.00 %	0%	0%	100%	100%
30	Support Facilities: Yards, Shops, Admin.	20.05	RM	99,425,456	0	\$0	\$0	99,425,456	
30.02	Light Maintenance Facility			8,161,279	0			8,161,279	8.21
30.03	Heavy Maintenance Facility			40,906,889	0			40,906,889	41.14
30.04	Storage or Maintenance of Way Building			8,382,270	0			8,382,270	8.43
30.05	Yard and Yard Track			41,975,018	0			41,975,018	42.22
	Percent of SCC 30 Total			100.00 %	00.00 %	0%	0%	100%	100%
40	Sitework & Special Conditions	20.05	RM	582,991,481	520,875,787	\$0	\$0	1,103,867,268	
40.01	Demolition, Clearing, Earthwork			11,116,220	23,579,582			34,695,802	3.14
40.02	Site Utilities, Utility Relocation			73,549,913	277,144,889			350,694,802	31.77
40.03	Haz. mat'l, contam'd soil removal/ mitigation			5,845,548	1,383,387			7,228,935	0.65
40.04	Environmental mitigation			12,346,995	18,494,911			30,841,906	2.79
40.05	Site structures (retaining walls, sound walls)			8,447,351	190,232			8,637,583	0.78
40.06	Pedestrian / bike access, landscaping			10,074,965	38,187,851			48,262,816	4.37
40.07	Automobile, bus accessways (roads, parking)			50,641,247	161,894,935			212,536,182	19.25
40.08	Temporary Facilities/other indirect costs			410,969,242	0			410,969,242	37.23
	Percent of SCC 40 Total			52.81 %	47.19 %	0%	0%	100%	100%

SCC	Description	Qty.	UM	Bid/ Awarded (\$)	Unit Pricing (\$)	CER	LS/ Allowance	Total (\$)	SCC %
50	Systems	20.05	RM	229,268,524	18,192,256	\$0	\$0	247,460,780	
50.01	Train control and signals			91,492,532	0			91,492,532	36.97
50.02	Traffic signals and crossing protection			222,407	12,301,603			12,524,010	5.06
50.03	Traction power supply: substations			32,873,933	0			32,873,933	13.28
50.04	Traction power distribution			30,535,634	0			30,535,634	12.34
50.05	Communications			59,889,234	5,890,653			65,779,887	26.58
50.06	Fare collection system and equipment			10,221,753	0			10,221,753	4.13
50.07	Central Control			4,033,031	0			4,033,031	1.63
	Percent of SCC 50 Total			92.65 %	7.35 %	0%	0%	100%	100%
60	ROW, Land, Existing Improvements	20.05	RM	3,680,000	218,508,386	\$0	\$0	222,188,386	
60.01	Purchase or lease of real estate			0	201,658,907			201,658,907	90.76
60.02	Relocation of existing households/businesses			3,680,000	16,849,479			20,529,479	9.24
	Percent of SCC 60 Total			1.66 %	98.34 %	0%	0%	100%	100%
70	Vehicles	80.00	EA	208,501,186	0	\$0	\$0	208,501,186	
70.01	Light Rail			186,061,066	0			186,061,066	89.24
70.06	Non-revenue vehicles			16,011,166	0			16,011,166	7.68
70.07	Spare parts			6,428,954	0			6,428,954	3.08
	Percent of SCC 70 Total			100.00 %	0.00 %	0%	0%	100%	100%
80	Professional Services	20.05	RM	845,019,265	338,806,763	\$0	\$0	1,183,826,028	
80.01	Preliminary Engineering			95,120,483	0			95,120,483	8.04
80.02	Final Design			137,506,107	120,428,801			257,934,908	21.79
80.03	Project Mgmt for Design/Construction			360,190,103	25,635,593			385,825,696	32.59
80.04	Construction Admin & Management			115,081,674	103,074,078			218,155,752	18.43
80.05	Professnl Liability/Non-Construction Ins.			24,252,773	25,585,256			48,838,029	4.21
80.06	Legal; Permits; Review Fees by other s			43,341,965	35,093,162			78,435,127	6.63
80.07	Surveys, Testing, Investigation, Inspection			3,139,444	21,815,882			24,955,326	2.11
80.08	Start up			66,386,716	7,173,991			73,560,707	6.21
	Percent of SCC 80 Total			71.38 %	28.62 %	0%	0%	100%	100%
	SUB-TOTAL			2,507,660,376	2,339,103,382			4,846,763,758	94.63
90	Unallocated Contingency	1.00	LS			0	0	101,871,170	
90.01	Unallocated Contingency			0	0			101,871,170	1.99
100	Finance Charges	1.00	LS	0	0	0		173,058,000	
100.01	Finance Charges			0	0			173,058,000	3.38
	GRAND TOTAL	20.0	RM	2,507,660,376	2,339,103,382	0		5,121,692,928	100 %
	PERCENT OF TOTAL			51.74%	48.26%	0%			

Table 16. 2011 Cost Estimate Classification (PE)

SCC	Description	Qty.	UM	Bid/ Awarded (\$)	Unit Pricing (\$)	CER	LS/ Allowance	Total (\$)	SCC %
10	Guideway & Track Elements	20.09	RM	577,945,000	730,412,000	\$0	\$0	1,308,357,000	
10.04	Guideway: Aerial structure	19745	RM	491,955,000	718,437,000			1,210,392,000	92.51
10.08	Guideway: Retained cut or fill	0.34	RM	7,402,000	0			7,402,000	0.57
10.09	Track: Direct fixation			75,485,000	9,771,000			85,256,000	6.52
10.11	Track: Ballasted			3,103,000				3,103,000	0.24
10.12	Track: Special (switches, turnouts)			0	2,204,000			2,204,000	0.17
	Percent of SCC10 Total			44.17%	55.83%	0%	0%	100%	100%
20	Stations, Stops, Terminals, Intermodals	21.00	EA	0	614,602,000	\$0	\$0	614,602,000	
20.01	At-grade station	1.00	EA	0	8,346,000			8,346,000	1.36
20.02	Aerial station	20.00	EA	0	449,606,000			449,606,000	73.15
20.06	Automobile parking multi-story structure			0	77,918,000			77,918,000	12.68
20.07	Elevators, escalators			0	78,732,000			78,732,000	12.81
	Percent of SCC 20 Total			0%	100.00%	0%	0%	100%	100%
30	Support Facilities: Yards, Shops, Admin.	20.09	RM	103,805,000	0	\$0	\$0	103,805,000	
30.02	Light Maintenance Facility			8,511,000	0			8,511,000	8.20
30.03	Heavy Maintenance Facility			42,778,000	0			42,778,000	41.21
30.04	Storage or Maintenance of Way Building			8,742,000	0			8,742,000	8.42
30.05	Yard and Yard Track			43,774,000	0			43,774,000	42.17
	Percent of SCC 30 Total			100%	0%	0%	0%	100%	100%
40	Sitework& Special Conditions	20.09	RM	495,006,000	526,452,000	\$0	\$0	1,021,458,000	
40.01	Demolition, Clearing, Earthwork			11,106,000	8,811,000			19,917,000	1.95
40.02	Site Utilities, Utility Relocation			77,206,000	281,171,000			358,377,000	35.08
40.03	Haz. mat'l, contam'd soil removal/ mitigation			6,107,000	1,426,000			7,533,000	0.74
40.04	Environmental mitigation			12,460,000	18,343,000			30,803,000	3.02
40.05	Site structures (retaining walls, sound walls)			7,988,000	14,948,000			22,936,000	2.25
40.06	Pedestrian / bike access, landscaping			3,939,000	40,735,000			44,674,000	4.37
40.07	Automobile, bus accessways (roads, parking)			51,911,000	161,018,000			212,929,000	20.85
40.08	Temporary Facilities/other indirect costs			324,289,000				324,289,000	31.75
	Percent of SCC 40 Total			48.46%	51.54%	0%	0%	100%	100%

SCC	Description	Qty.	UM	Bid/ Awarded (\$)	Unit Pricing (\$)	CER	LS/ Allowance	Total (\$)	SCC %
50	Systems	20.09	RM	232,967,000	18,620,000	\$0	\$0	251,587,000	
50.01	Train control and signals			92,601,000	0			92,601,000	36.81
50.02	Traffic signals and crossing protection			211,000	12,832,000			13,043,000	5.18
50.03	Traction power supply: substations			33,801,000	0			33,801,000	13.44
50.04	Traction power distribution			31,559,000	5,788,000			37,347,000	14.84
50.05	Communications			60,603,000	0			60,603,000	24.09
50.06	Fare collection system and equipment			10,324,000	0			10,324,000	4.10
50.07	Central Control			3,868,000	0			3,868,000	1.54
	Percent of SCC 50 Total			92.60%	7.40%	0%	0%	100%	100%
60	ROW, Land, Existing Improvements	20.09	RM	0	247,942,000	\$0	\$0	247,942,000	
60.01	Purchase or lease of real estate			0	224,649,000			224,649,000	90.61
60.02	Relocation of existing households/businesses			0	23,293,000			23,293,000	9.39
	Percent of SCC 60 Total			0%	100%	0%	0%	100%	100%
70	Vehicles	80.00	EA	212,461,000	0	\$0	\$0	212,461,000	
70.01	Light Rail			191,657,000	0			191,657,000	90.21
70.06	Non-revenue vehicles			14,590,000	0			14,590,000	6.87
70.07	Spare parts			6,214,000	0			6,214,000	2.92
	Percent of SCC 70 Total			100%	0%	0%	0%	100%	100%
80	Professional Services	20.09	RM	310,838,000	720,210,000	\$0	\$0	1,031,048,000	
80.01	Preliminary Engineering			56,123,000				56,123,000	5.44
80.02	Final Design			125,392,000	100,981,000			226,373,000	21.96
80.03	Project Management for Design/Construction			74,982,000	274,032,000			349,014,000	33.85
80.04	Construction Administration & Management			0	187,914,000			187,914,000	18.23
80.05	Professional Liability/Non-Construction Ins.			0	56,104,000			56,104,000	5.44
80.06	Legal; Permits; Review Fees by other agencies			0	69,913,000			69,913,000	6.78
80.07	Surveys, Testing, Investigation, Inspection			631,000	5,442,000			6,073,000	0.59
80.08	Start up			53,710,000	25,824,000			79,534,000	7.71
	Percent of SCC 80 Total			30.15%	69.85%	0%	0%	100%	100%
90	Unallocated Contingency	1.00	LS	0	0	0	191,650,417	191,650,417	
90.01	Unallocated Contingency			0	0		191,650,417	191,650,417	100%
100	Finance Charges	1.00	LS	0	0	0	230,000,000	230,000,000	
100.01	Finance Charges			0	0		230,000,000	230,000,000	100%
GRAND TOTAL		20.0	RM	1,933,022,000	2,858,238,000	0	421,650,417	5,212,910,417	
PERCENT OF TOTAL				37.08%	54.83%	0%	8.09%	100%	

(1) SCC 10 – Guideway and Track Elements

Quantity Review

The PMOC checked the overall length of the guideways, calculating an average length for the alignment of 105,888 feet, not counting 1,729 feet of railroad siding at Aloha Stadium and Ala Moana stations. This value does not have an impact to the budget as the estimate is sufficiently detailed and does not rely on this parametric type value for calculations.

The grantee combined the Airport and City Center Guideway segments into one construction package as a cost reduction measure, although, both segments retain separate design packages since the Airport segment engineering contract was previously awarded. The grantee estimates a 5 percent reduction in some unit costs and savings due to the combination of certain managerial and administrative costs. Appendix “E” of the Basis of Cost describes this in more detail and the approximate reduction in YOE cost is \$27 million.

Value Engineering Analysis

The grantee held a Value Engineering (VE) workshop for the Airport and City Center guideway line segments during the week April 11-15, 2011. The workshop resulted in \$225 million in potential cost savings associated with alternative alignments, foundations, superstructures, and contracting methods. The grantee has been slow to apply or realize these savings and continue with further evaluation and exploration of other cost saving alternatives.

Unit Measure Pricing Review

The PMOC determined the SCC line item quantities are reasonable and the average unit pricing fall within the mid to high range. The material price for various types of track work is trending high as compared to industry standard pricing but this may be a result of most of the alignment being elevated and located in existing roadway ROW. Since the track work quantity is definitive and the design falls within industry standards, the material and labor costs are traceable and justified.

The PMOC compared the unit pricing from the two award DB contract bids, West Oahu/Farrington Highway (WOGH) and Kamehameha Highway, to the remaining contract segments yet to be bid. The PMOC determined the remaining segment cost estimates contained unit pricing averaging 50% higher than the two DB awarded DB contract bid unit pricing. Some of the higher pricing is attributable to the inefficiencies associated with restricted work space in the more dense and congested downtown areas.

The PMOC did not find any significant issues through the analysis of segregated line item pricing above \$200,000 for this SCC. Approximately 42.25% (538.78 million) of the SCC 10 budget amount is under award.

The PMOC determined the cost estimate SCC 10 budget is fair and reasonable as no major discrepancies or issues were found.

(2) *SCC 20 – Stations, Stops, Terminals, Intermodal Facilities*

Quantity Review

Those portions of the station estimate that were checked relative to the numbers of major station-related elements observed on the preliminary station plans, are accurate. The PMOC made an overall check of the individual station costs to identify any potential discrepancies or issues. The stations designs have recently been modified to a new “Modular Station Concept” in an effort to avoid the variety of designs previously included at each station location. This method will lower costs as many of the station elements will be similar or repetitive and easier to construct. The modular station designs simplified some aspect of the stations, but there were offsetting costs for the guideway, elevator/escalator and sitework contracts. These offsetting costs were an interim adjustment by the PMOC based on supporting documentation from HART, but the final May 15th Estimate revision incorporated the offsets and the adjustment is no longer required.

The PMOC did find an inconsistency due to the omission of prime contractor markup from certain portions of the station contracts (estimate). The grantee stated the omission was intentional as the stations are a different “type” of work element than the guideways and the markup would be less. The grantee contended the compact station sites do not justify the higher markups used for alignments and utility work, which are linear and requiring of frequent moves by the general contractors to progress the work.

The PMOC could not substantiate this basis with enough certainty and confidence so an adjustment of \$15.24 million for this element to condition the grantee’s estimate for the Risk Assessment model and subsequent analysis. Of the \$15.24 million adjustment \$9.50 million was for the Stations and the other \$5.74 million was added to various contract categories in SCC 40.

Unit Measure Pricing Review

The documents are now developed sufficiently to allow generation of a mostly bottoms-up estimate even with the recent and not fully designed “modular station concept”. The PMOC noted the station costs are higher than average elevated stations on other projects but agrees the costs are reasonable due to the geographic location of the project, amount of vertical circulation and the complexity of the stations. Some savings were realized as some of the VE recommendations are now included in the final design and in the May 15, 2012 Estimate.

Value Engineering Analysis

The grantee held a VE workshop in the summer of 2010 for the stations. The results of this workshop indicated some significant potential savings, and in the 3Q2011 and 4Q2011, some of the VE station elements were incorporated into the project and budget and the “modular station concept” utilized some of the recommendations.

(3) ***SCC 30 – Support Facilities: Yards, Shops & Admin. Building***

Quantity Review

The PMOC did not conduct a quantity survey or sampling because the Project Maintenance and Storage Facility (MSF) design build contract is under award. The cost estimate line items for this SCC have been replaced by the Contractor's Schedule of Values.

Unit Measure Pricing Review

The SCC 30 costs (\$99.4 million) are completely distributed among the DB contract currently under award. The cost estimate line items for this SCC have been replaced by the Contractor's Schedule of Values.

The PMOC determined the cost estimate SCC 30 budget is fair and reasonable as no major discrepancies or issues were found.

(4) ***SCC 40 – Sitework & Special Conditions***

Quantity Review

Almost 53% of the SCC 40 work is under contract award. The remaining work contains a 20% contingency factor as it contains more uncertainty and higher risks than other work elements. The PMOC incorporated higher beta factors for SCC 40 work with an emphasis on the uncertainties associated with underground utility abandonment, relocations, and installation.

Unit Measure Pricing Review

The PMOC performed a unit price review of all work elements in excess of \$200,000 (Pareto). The PMOC did not find any significant discrepancies or issues with SCC 40 line item pricing.

Unit Measure Pricing Review

Almost 53% (\$583 million) of the SCC 40 work is under contract award.

(5) ***SCC 50 – Systems***

Quantity Review

The PMOC did not conduct a quantity survey or sampling because the Core Systems Contract (DBOM) has been awarded. The Project Estimate line items for this SCC have been replaced by the Contractor's Schedule of Value.

The values shown in Table 3 and Table 28 are primarily from a bid and award result from the Contractor's Schedule of Value. The PMOC initially had difficulty following the methodology the grantee used to determine the value used in the BCE as compared to the CSC proposal amounts. A write-up and table was provided in Appendix "U" in the 2011 Basis of Estimate; however, the grantee could not clearly explain how the information

was calculated. Subsequently the grantee provided more transparent and supportable information to the PMOC's satisfaction.

The SCC 50 is based on a CSC contract awarded to Ansaldo Honolulu Joint Venture (AHJV) on March 21, 2011.

Unit Measure Pricing Review

Almost 93% (\$229.3 million) of the SCC 50 work is under contract requiring minimal analysis by the PMOC. The PMOC determined the cost estimate SCC 30 budget is fair and reasonable as no major discrepancies or issues were found.

(6) *SCC 60 – Right-of-Way*

Quantity Review

The real estate easement and parcel quantities equal the quantities and descriptions identified in the grantee's Real Estate Acquisition Management Plan (RAMP). Likewise, the quantities are consistent as represented in the master project schedule.

Unit Measure Pricing Review

The costs are distributed with the Unit price and Plan Quantity items (\$218.51 million) not yet acquired. Some property has been acquired for the WOFH contract as well as some relocations have been completed. A review of the SCC line items resulted in the following observations:

- *SCC 60.01 Purchase or lease of real estate*
The grantee's basis for determining real estate costs was derived from the City or County tax assessment database values which are updated bi-annually.

The grantee has performed some appraisals and has purchased property as well as performed relocations for the DBB contracts.

The PMOC determined the grantee's initial real estate parcel cost estimate methodology and amounts were outdated and needing "refreshing" with up-to-date appraisals and or analyzed with more recent comparisons purchases. The grantee did note that initial appraisals and purchases made to date have been within the most recent SCC 60 budget.

The grantee provided additional information to support the values in the SCC workbook as they initially did not match the separate Real Estate Estimate and the PMOC now acknowledged the Real Estate Estimate supports the SCC values.

(7) *SCC 70 – Vehicles*

Quantity Review

The 2012 SCC Estimate includes the procurement of eighty (80) rail vehicles. Procurement of eighty (80) vehicles is included in the CSC contract which has been awarded.

Unit Measure Pricing Review

The SCC 70 costs (\$208.5 million) are completely distributed among the DBOM contract currently under award. The SCC 70 cost estimate line items have been replaced by the Contractor's Schedule of Value line items. The PMOC determined the cost estimate SCC 70 budget is fair and reasonable as no major discrepancies or issues were found.

(8) SCC 80 – Professional Services

Quantity Review

The basis used to determine the SCC 80 line item amounts is calculated using staffing plans combined with the validation of the design-build bids received and awarded for PE work. The PMOC determined the cost estimate matches the current staffing plan and planned work represented in the master project schedule.

Unit Measure Pricing Review

Professional Services is one of the largest cost categories in the 2012 SCC Estimate and as such can be a source for variability in project costs, especially if delays occur. It is anticipated that once the project is advanced into construction, more detailed staffing plans will be developed to improve the accuracy of these estimates and mitigate the potential for costs overruns.

Almost 71.4% (\$845.0 million) of the SCC 80 work is under contract award and distributed and replaced in the cost estimate by the contractor's Schedule of Value line items.

The PMOC determined the cost estimate SCC 80 budget is fair and reasonable as no major discrepancies or issues were found.

(9) SCC 100 Finance Charges

Quantity Review

Not Applicable for Finance Costs.

Unit Measure Pricing Review

The SCC 100 line item costs are distributed with the Estimated Quantity items (\$173.06 million) representing 100% of the estimate for this portion of the work. This was moved from the Lump Sum category to the Estimated Quantity category as the value is based on calculations within the grantee's revised Financial Plan.

The allowance for Finance Charges is to reflect the cost of borrowing to match the cash flow requirements for construction progress payments versus the anticipated flow of funding from the contributing agencies.

Detailed Review of Cost Items

The PMOC reviewed and sampled quantities for alignment lengths, comparative station unit prices, and unit prices for items totaling more than \$200,000 and examined the various markups utilized within the estimate. The cost estimate includes specific allowances or lump sums for line items (work scope), but a portion of the allowances are supported by separate stand-alone estimates. Additionally, the values for escalation, finance and contingency are percentages or calculations from other values and could be considered lump sums or allowances.

Evaluation of Allowances

As noted above the grantee's estimate includes some values with unit measures as lump sum, all, location or allowance. The PMOC identified these values in its review of the grantee's cost estimate during the sorting of line item costs for comparative purposes. The costs discussed in this section are in base year 2012 dollars without contingency and total \$580 million. Most of these allowances were determined by separate estimates and summarized by LS line items in the Project Estimate.

The PMOC also identified allowances within the Timberline Estimate that are Lump Sum negatives; these values are in some cases for deductions taken as a result of the 2011 VE cost reduction measures and design improvements specific to the modular station design. There are separate detailed estimates that support these values. The PMOC has determined the allowances included in the Project Estimate line items for the modular station concepts are conservative. The modular station design concepts Lump Sums are supported by separate documentation supplied to the PMOC.

The Airport & City Center guideway segment cost estimate line items contain several lump sum and allowance unit measures, for items such as Labor Overtime Projections for girder erection, Hazardous Materials & Environmental Mitigations and similar items.

Finally the Soft Costs Lump Sums are detailed in the Basis of Estimate document and supported by staffing plans; all of these various allowances and lump sums are illustrated in the table below.

Table 17. May 2012 List of Allowances and Lump Sums

SCC	Contract	Estimate Description	Qty.	Unit	2012 Base (\$)	Comments
VE COST REDUCTIONS from FALL 2011					(8,677,320)	
40.07	DBB-275	Delete Elevated Kiss n Ride	(1)	LS	(6,493,750)	HART provided some details
40.07	DBB-275	Delete Pedestrian Walkways	(1)	LS	(1,440,843)	HART provided some details
10.04	DBB-520	Reduced Span & Cross-Sections of Straddle Bents	(1)	LS	(742,727)	HART provided some details
UN-BID GUIDEWAY CONTRACT					67,182,800	
10.04	DBB-520	Overtime for Foundations & Superstructure Erection	9	LS	35,785,882	Overall Unit price reasonable
40.03	DBB-520	Guideway Hazardous Materials Mitigation	4	LS	1,015,568	Overall Unit price reasonable
40.04	DBB-520	Guideway Environmental Mitigation	2	LS	13,427,743	Overall Unit price reasonable
40.01	DBB-520	Guideway Building Re-Construction	3	ALL	9,359,556	Overall Unit price reasonable
40.02	DBB-520	Guideway Perm/Temp Service Connections	2	LS	7,594,051	Overall Unit price reasonable
UN-AWARDED STATION CONTRACTS					66,365,722	
20.02	DBB-270	Structure, Platform, Bridge & Ancillary Building	15	LS	36,489,324	More detail likely exists
40.06	DBB-270	Landscaping	6	LS	617,860	More detail likely exists
20.02	DBB-600	Architectural Finishes, Painting & Caulking Allowances	4	LS	301,137	More detail likely exists
40.02	DBB-170-575	CS Raceway from Guideway to Building	12	LS	1,678,447	More detail likely exists
40.02	DBB-170-575	General Sitework Utilities HDR/RLB	3	LS	547,047	More detail likely exists
40.02	DBB-170-575	Subgrade Cable Tray Raceways	10	LS	3,091,880	More detail likely exists
40.07	DBB-275	Add at-Grade Kiss n Ride	1	LS	467,550	More detail likely exists
40.07	DBB-275	Signage and Striping	5	LS	640,718	More detail likely exists
40.07	DBB-170-575	Maintenance of Highways	4	ALL	19,736,123	More detail likely exists
40.07	DBB-170-575	General Sitework	3	LS	2,795,636	More detail likely exists
UN-BID UTILITIES AND RIGHT OF WAY					189,353,037	
40.02ET	ROW	Utilities – Temp/Permanent Service Connections	3	LS	11,884,649	More detail likely exists
Var 60	ROW	Right of Way and Relocation Costs	2	LS	177,468,388	More detail likely exists
SOFT COST					265,705,468	
Var 80	HART-201	PM, non-OCIP Insurance, City Legal & Start-Up	4	LS	41,665,165	Supported by staffing plans
80.02	FD-140-600	Final Design at Stations	8	LS	98,912,753	Supported by staffing plans
80.07	FD-140-600	Surveys, Testing and Inspections	8	LS	11,800,000	Supported by staffing plans
Var 80	MM945,946,975	LEED, On-Call and Haz-Mat Contractors	3	LS	3,363,519	Supported by staffing plans
80.04	MM-180-600	Construction Management Contracts	8	LS	77,941,823	Supported by staffing plans
80.05	MM-950&951	OCIP and OCIP Admin Cost	2	LS	8,791,931	Supported by staffing plans
80.06	MM921-923	Plan Review by Other Agencies	3	LS	17,535,277	Supported by staffing plans
80.07	MM-180-600	Surveys, Testing and Inspections	8	LS	5,695,000	Supported by staffing plans
TOTAL					579,929,707	

Note: No contingency included.

The PMOC focused on lump sum and allowance line items since a significant amount of uncertainty exists with these difficult-to-quantify unit measures. As noted the first allowance of \$9 million for Value Engineering Cost Reductions was supported by previously detailed estimates not included in the May 15, 2012 Estimate.

The lump sum amount of \$67 million within the guideway portion of the estimate is justified by using the average pricing from the previously awarded design build contract bids for guideways. The grantee increased the unit costs by approximately 50 percent for the now combined Airport and City Center guideway segment construction line items since both segments were recently combined into one construction package. The price adjustment includes inefficiency factors for the most easterly Guideway segments located in the corridor’s most densely populated urban area. The PMOC believes the price adjustments are conservative and reasonable. Following is a table identifying the unit price in the awarded guideway contracts compared to the not-awarded work for the Airport and City Center segments, these unit costs are in escalated YOE dollars with contingency versus 2012dollars.

Lump sum amounts in the Stations category (\$66 million) include “not to exceed” values for finishes, and painting and hardscape; other values include the Modular Station Concept. The PMOC received additional documentation supporting the adjustments which is also included in the Basis of Estimate Attachment D. The PMOC recommends the grantee provide more detailed estimate justification to better support these quantities and pricing amounts.

The Soft Costs Lump Sums are supported by Staffing plans contained within the separate Basis of Estimate document.

Table 18. Guideway Unit Cost Review 2012 data

Guideway Segment	Qty	Unit	YOE Cost	Unit Cost	Comments
WOFH (Awarded)	36,230	FT			
Elevated Guideway Cost (fnd. & superstructure)			\$306,978,000	\$8,473	
Kamehameha Highway (Awarded)	20,494	FT			
Elevated Guideway Cost (fnd. & superstructure)			\$184,977,000	\$9,026	
Airport & CC Combined (Un-awarded)	49,155	FT			
Elevated Guideway Cost (fnd. & superstructure)			\$725,145,000	\$14,752	Unit cost higher in more dense urban area

Note: Includes allocated contingency. All values are in YOES\$ and are based on grantee SCC Summary.

3.4.4 Mechanical Check of Estimate

The PMOC conducted a mechanical soundness check for each SCC in the Project Estimate. These mechanical checks are used to determine if there are any material inaccuracies or formula errors. The 2012 SCC Estimate was found to be mechanically correct in the tabulation of the unit cost, application of factors, and translation to the SCC workbook. As discussed elsewhere in this report, the PMOC randomly sampled cost estimate line items to determine if the cost estimate backup cross-walked into the SCC workbook. In each instance the PMOC found the

calculated values translated to the SCC workbook and back to the cost estimate backup without variance or mechanical issues.

3.4.5 Comparison to Industry Standards

The PMOC summarized and rated the cost estimate in aggregate by using one of the more widely-used industry standards in cost estimation and cost engineering (*AACE International Cost Estimate Classification System, Recommended Standard 17-R97*). This standard generally describes cost estimates relative to the project level of definition, where "5" represents the least defined and "1" represents the most defined. Along with the Level of Project Definition, the recommended practice establishes the expected Accuracy Range for five estimate classifications (Table 19). An estimate's quality can be measured by its overall accuracy range.

Table 19. AACE Estimate Classification System

Cost Estimate Class	Primary Characteristic	Secondary Characteristic			
	Level of Project Definition (%of Completion)	Purpose of Estimate	Estimating Methodology	Expected Accuracy Range*	Expected Accuracy Range in Percent
Class 5	0 to 2	Screening or Feasibility	Stochastic or Judgment	40 to 20	+400 to -100
Class 4	1 to 15	Concept Study or Feasibility	Primarily Stochastic	3 to 12	+160 to -60
Class 3	10 to 40	Budget Authorization, or Control	Mixed, but Primarily Stochastic	2 to 6	+60 to -30
Class 2	30 to 70	Control or Bid/Tender	Primarily Deterministic	1 to 3	+30 to -15
Class 1	50 to 100	Check Estimate or Bid/Tender	Deterministic	1	+10 to -5

*Note: If the range index value of "1" represents +10/-5%, then an index of value of 10 represents +100/-50 percent.

The PMOC has determined the grantee's 2012 SCC Estimate and supporting documentation is an AACE "Class 2" estimate as many of the values are based on awarded contracts. Since the awarded contracts are mostly design-build, they lack more definitive information associated with 100% final design documents typically associated with Class 2, although a significant amount of certainty is established with the awarded contracts increasing the expected accuracy range as noted in the above table.

3.4.6 Correspondence with Scope Review

The PMOC performed a review of the PE-level drawings, Basis of Estimate and corresponding 2012 SCC Estimate to:

- (1) Cross check sampled quantity estimates with the project scope contained in the design documents.
- (2) Perform a "sanity check" of the estimate to ensure all major components are captured.

- (3) Review sample quantities for reasonableness and representation of industry standards.

The review of the cost estimate yielded that each of the major elements for the project included an estimated cost. As noted within this report, the PMOC checked a sampling of quantities from the cost estimate. The values were found to be consistent with the scope drawings. Quantity take offs were performed by the grantee estimating team and provided to the PMOC.

3.4.7 Evaluation of Contract Package Elements

The grantee is using a combination of multiple contract delivery methods including Design-Build-Operate-Maintain procured under the Best Value approach for the Core Systems Contract, design-build for the larger alignment segments and design-build-bid for the station and smaller work packages. While the procurement process at times has proven arduous and challenging, the grantee has improved its approach and technique to deploy procurement package strategies and contract administration. Professional services and contract procurement falls under HART authority. Most of the contract proposals contain lump sum unit measure in lieu of unit pricing which reduces the need to provide extensive work performance measurement during construction.

The Design and CM contracts include clauses for items such as salary increases limited by a maximum percentage. Some contracts include liquidated damage clauses, restrictive work hours and escalatory clauses that may impact project costs. Such restrictive contract language is necessary but comes with a price although certain management techniques and controls must be implemented to suit the grantee's best interests. The grantee does have the means to control such cost impacts.

Elements such as the need for a precast yard (either on the island or the mainland) will affect pricing and create scheduling issues because of the permitting process required. Similarly, the need for specialty equipment or the Buy America requirements can affect price, but these are inherent in this project and although somewhat unique are not overly restrictive requirements.

All contracts have clauses for changed conditions and a process is in place within the grantee's management structure to address change orders. Contract delivery method strategy usually contemplates the value of design build and the ultimate costs of changes stemming from design build because offerors may inflate their prices to cover potential issues in a design-build scenario, where the DBB simply submit the more scrutinized change orders after the contract is executed.

3.4.8 Costs Associated with General and Supplementary Conditions

The GEC generated detailed assemblies for the *2012 SCC Estimate*. This estimate included the contractor's overhead and profit (General Conditions) in the unit costs as variable percentages dependent upon the individual assembly and estimator's judgment along with other specific markups as follows:

- Lump Sum values for Maintenance of Traffic for all contracts

- 6.0% for Mobilization/Demobilization
- 4.712% General Excise Tax (GET)

All line items in the *2012 SCC Estimate* include contractor indirect costs, overhead & profit, and allocated design and construction contingencies; the percentages are described in minor detail in the Basis of Estimate document (Appendix Q), and in greater detail within the Timberline format. The *2012 SCC Estimate* does include separate categories or line item(s) for indirect costs within the Timberline Estimate detail. Information typically contained in a General Conditions estimate includes:

- Detailed Construction Schedule
- Contracting and delivery strategy (i.e. DB, CM-at-Risk, Multiple Prime, Fast-track)
- Necessary equipment lists and durations
- Contract requirements for Quality Control/Assurance, Scheduling, Traffic Control, Ligated Damages, and Assignment of Risks

The PMOC recognizes that a detailed line item estimate for General Conditions is normal for this stage of the project and appropriate percentages are included within the grantee’s estimate.

The Timberline cost estimate matrix is based on detailed costs for labor, materials, equipment and subcontractors, which represent the PE Estimate “direct costs”. Additional costs, such as general contractor overhead costs, profit, construction risk insurance and other non-direct project implementation costs are categorized as “indirect costs” or General Condition costs. These costs are identified within the Timberline cost estimate as “mark-ups” and are applied based on the estimator’s judgment during preparation of the estimate. It is the PMOC’s professional opinion these percentages are reasonable and adequately applied to cost estimate line items for remaining work yet to bid.

3.4.9 Contingencies

Latent and patent contingency factors are not included within the *2012 SCC Estimate*. Allocated and unallocated contingencies are presented in detail in the grantee’s Excel Cash Flow Document entitled “*HART FFGA_Cash Flows 14May2012ver16*”. This document also contains the escalation included in the SCC Summary.

Allocated Contingency

The allocated contingency for the project is \$541,689,341 (YOE), or 12.58%.

Allocated contingency is included in the unit price estimate on individual estimate lines where appropriate. Allocated contingency represents the stated included in the base pricing. It is a clear contingency add to the price as noted in the build-up or shown in the estimate line as a specific factor. Allocated contingency is reported with the category total to which it applies. It is separated in the SCC cost summary sheets for the purposes of reporting and risk analysis.

The following table presents the amount of allocated contingency included in the 2012 SCC Estimate for each SCC. It should be noted that sufficiency of total project contingency is assessed as part of the FTA risk review.

Table 20. Allocated Contingency

SCC	Allocated Contingency (YOE \$M)	% Contingency	PMOC Assessment*
10	161.11	14.46 %	Reasonable given amount of SCC scope that has been awarded under DB contract
20	70.62	20.00 %	Reasonable since some design development is at FD-level
30	7.52	7.45 %	Reasonable since there is a bid price under MSF contract
40	88.72	12.57 %	Potentially low given amount of SCC scope that has been awarded under DB contract
50	33.08	11.83 %	Reasonable since there is a bid price under CSC
60	17.07	12.56 %	Low based on review of basis of estimate and later purchases are usually more problematic and costly
70	27.25	11.60 %	Reasonable since there is a bid price under CSC
80	65.81	8.56 %	Potentially low; professional services contracts must be effectively managed to ensure there is sufficient contingency

*Total recommended project contingency is discussed in the OP 40 review.

Unallocated Contingency

The unallocated contingency for the project is \$101,871,000 (YOE), or 2.31%.

Project unallocated contingency is developed in a built-up method by applying contingency factors to each corresponding line in the estimate, and then pooling the resulting total in the unallocated contingency cost code. The percentages are based on the grantee’s subjective view of the inherent risk associated with the particular work type. Sufficiency of the total contingency, both allocated and unallocated, is assessed as part of the FTA risk review.

Latent Contingency

The existence and application of latent contingency was discussed at the April 2012 Risk Assessment Workshop. The grantee, risk management consultant, and the cost estimating consultants specifically stated the Project Estimate does not contain latent contingency. Upon independent review, the PMOC could not identify the existence of latent contingency but noted lump sum and allowance unit measures would typically be instances where latent contingency could be “buried”.

3.4.10 Review of Cost Estimate Escalation

(1) Review of Sources and Methodology Used in HART’s Forecasts

The analysis of the escalation rates and supporting methodology for the Project involved the review of the following documents prepared by the Honolulu Authority for Rapid Transportation (HART) and its consultants:

- **“HART FFGA_Cash Flows 14May2012ver16”** (HART Cash Flow Model) which is a spreadsheet model that summarizes quarterly and annual cash flows from 2011 to 2021;

- The “*Honolulu Rail Transit Project Construction Cost Inflation Preliminary Findings*” dated February 20, 2012” (Preliminary Findings Report). This report describes the macroeconomic factors that influence cost escalation rates for each major commodity category—steel, concrete, labor, other materials, construction equipment, and professional services.

Table 21 summarizes the annual escalation rates that were used in the HART Cash Flow model. The annual escalation rates for Right-of-Way (ROW) costs are built in the “Current Contracts – Soft” category.

Table 21. HART Cash Flow Model, Annual Escalation Rates by Commodity 2013-20

Commodity	Year								
	2013	2014	2015	2016	2017	2018	2019	2020	Avg.
Cement/Concrete	4.80%	4.50%	4.20%	3.90%	3.80%	3.60%	3.40%	3.40%	3.95%
Steel	6.80%	6.30%	5.80%	5.60%	5.40%	5.10%	4.80%	4.80%	5.58%
Labor	3.80%	3.80%	3.80%	3.80%	3.80%	3.80%	3.80%	3.80%	3.80%
Construction Equipment	4.10%	3.70%	3.20%	3.10%	2.90%	2.80%	2.60%	2.60%	3.13%
Other Materials	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%
Prof. Services	3.60%	3.80%	3.80%	3.80%	3.90%	4.00%	4.00%	4.00%	3.86%
Current Contracts - Soft	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.53%
Current Contracts - DB/FD	9.30%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	4.50%	5.12%

The analyses prepared by HART and its consultants present dissimilar escalation rates from 2013 to 2019, which have distinctive implications on total estimated costs for the project during design and construction. The average escalation rates in HART’s Cash Flow Model are generally more conservative and are closer to the average escalation rates provided by HART’s predecessor (the City and County of Honolulu) in 2011. Except for professional services, the escalation rates in HART’s Cash Flow Model are generally in line with the PMOC’s recommendations from 2011. The different sets of escalation rates prepared by HART along with the escalation rates proposed by the PMOC in 2011 are summarized in Table 22.

Table 22. Comparison of Average Escalation Rates, 2013-2020

Commodity	PMOC Report (2011)	City and County Forecast (2011)	HART Cash Flow Model (2012)	HART Preliminary Findings(2012)
Concrete	4.42%	4.07%	3.95%	2.5% to 3.0%
Labor	3.71%	3.81%	3.80%	3.0% to 4.0%
Other Materials	4.80%	4.77%	4.80%	3.5% to 4.0%
Steel	5.91%	5.90%	5.58%	3.5% to 5.0%
Right-of-Way (ROW)	4.07%	0.84%	4.53%	N/A
Construction Equipment	3.00%	3.16%	3.13%	3.5% to 4.5%
Vehicles (rail)	3.12%	3.13%	N/A	N/A
Professional Services	5.61%	3.77%	3.86%	3.0% to 3.5%

The major changes in the Cash Flow Model from the previous year’s estimate relate to the escalation rates for Right-of-Way (ROW) and steel. The Cash Flow Model escalates ROW by 4.53% annually, compared to an estimated 0.84% annual rate used in 2011. This escalation rate for ROW is slightly higher than the rate proposed by the PMOC. Another difference is the escalation rate for steel, which is escalated by annual average of 5.58% in the Cash Flow Model compared to a 5.90% average escalation rate in the 2011 report. It should be noted that the escalation rates for concrete and steel used in the spreadsheet model are higher in the first years of the forecast, but decline steadily during the forecast period.

However, the estimated escalation rates provided in the report entitled “Honolulu Rail Transit Project Construction Cost Inflation, Preliminary Findings” are generally lower than the escalation rates included in the City and County’s 2011 report, the 2012 Cash Flow Model, and the PMOC’s 2011 recommendations. Table 3 shows the differences between the PMOC’s recommended rates with the 2011 and 2012 forecasts prepared by HART and its predecessor. Because the Preliminary Findings Report suggests a range of values, the mid-point value was used to estimate the differences between these escalation rates and the PMOC’s 2011 recommendations. The average escalation rate for concrete, steel, other materials, and professional services differed by more than 1% in relation to the PMOC’s 2011 forecast. Professional services had a variance of more than 1% in all three forecasts prepared by the project sponsor.

Table 23. Difference between HART and PMOC Proposed Escalation Rates

Cost Escalation Factor	City and County Forecast (2011)	HART Cash Flow Model (2012)	Preliminary Finding (2012): Mid-point value
Concrete	0.35%	0.47%	1.67%
Labor	-0.10%	-0.09%	0.21%
Other Materials	0.03%	0.00%	1.05%
Steel	0.01%	0.33%	1.66%
ROW	3.23%	-0.46%	N/A
Construction Equipment	-0.16%	-0.13%	-1.00%
Vehicles (rail)	-0.01%	N/A	N/A
Professional Services	1.84%	1.75%	2.36%
Average	0.27%	0.65%	0.99%

In developing its forecasts, HART took into account the current and anticipated outlook for the national and state economies as well as local market for labor. The main points and findings from the review of the HART’s Cash Flow Model are the following:

- Except for professional services, the annual cost escalation factors for labor, concrete, steel, construction equipment, rail vehicles, and ROW are generally appropriate and do not require further adjustment at this time.
- The annual cost escalation rates for steel and concrete could be increased for 2016 and beyond, if there are additional delays in the construction schedule.
- The annual escalation rate of 3.86% for professional services may underestimate these costs during the forecast period. In the 2011 report, it was indicated that professional services from the mainland U.S would comprise 75% of total professional services costs with remaining being sourced locally. A higher cost escalation rate would better account for growth in professional services salaries, benefits, temporary housing, and travel costs.
- The escalation rate for other materials appears to cover asphalt and related products as well as generalized inflation in the construction sector.

The cost escalation forecasts summarized in the Preliminary Findings Report are generally lower compared to the 2011 report and HART’s Cash Flow Model. The lowered forecasts are based on an assumption that the slow economic recovery of recent years would continue during the forecast period. The Preliminary Findings Report is based on a number of generally accepted sources of data. These include the following:

- Engineering News Record (ENR)’s 2011 Construction Outlook;
- Moody’s commodity forecasts;
- Global Insight forecasts;
- Economic Forecasting Review (EFR);

- PB Highway Construction Cost Index (HCCI);
- Bureau of Labor Statistics (BLS);
- Energy Information Administration (EIA); and
- Associated General Contractors

The estimated difference between total costs with respect to the annual escalation rates used in the HART Cash Flow Model and the mid-point values listed in the preliminary findings report is roughly \$58.9 million. This difference by commodity type is summarized in the table below.

Table 24. Difference between 2012 Preliminary Findings Report and 2011 Report

Labor	Concrete	Steel	Other Materials	Cons. Equip.	ROW	Vehicles	Prof. Services	Total
N/A	\$17.3	\$29.3	\$6.1	N/A	N/A	N/A	\$6.0	\$58.9

(2) Recommendations

To review and evaluate the reasonableness of the escalation rates suggested by HART, the PMOC evaluated historical and forecast macroeconomic data as well as industry trends for each cost factor. This was used to develop an escalation forecast for each cost factor. The PMOC’s forecast factors the timing and magnitude of the ongoing economic recovery in the U.S., local economic conditions in Hawaii, and other factors.

From 2001 to 2011, real Gross Domestic Product (GDP), industrial production, and the Consumer Price Index (CPI, excluding energy) in the U.S. increased by an annual average rate of 1.7%, 0.5%, and 2.4%, respectively. This includes the recession that began and ended in 2001 and the 2007-09 recessions. The latter downturn resulted in zero growth in real GDP and a -3.3% decrease in industrial production in 2008. Real GDP decreased by an additional -2.6% in 2009, but recovered in 2010 with a 2.9% annual increase. During 2011, real GDP increased by 1.7%.

Due to a lag in economic activity, industrial production decreased by -9.3% in 2009, but rebounded with a 5.8% increase in 2010 and a 3.9% increase in 2011. Additionally, the generalized Producer Price Index (PPI), which measures the average change in selling prices received by domestic producers of goods and services, increased by an average of 3.3% from 2001 to 2011. This includes a -4.9% decrease during 2009 as well as 5.0% and 7.8% increases in the PPI during 2010 and 2011, respectively. Historical growth rates for these economic indicators are summarized in Table 5.

Table 25. Historical Real GDP, Industrial Production, and CPI 2001 – 2011

Year	Real GDP Growth (Year/Year)	Industrial Production (Year/Year)	Consumer Price Index	Producer Price Index
2001	0.8%	0.4%	1.6%	0.8%
2002	1.6%	-3.3%	2.3%	-0.7%
2003	2.5%	1.1%	2.7%	2.5%
2004	3.6%	2.5%	3.4%	4.2%
2005	2.9%	3.3%	3.2%	5.5%

Year	Real GDP Growth (Year/Year)	Industrial Production (Year/Year)	Consumer Price Index	Producer Price Index
2006	2.8%	2.2%	2.8%	4.0%
2007	2.0%	1.7%	3.8%	3.8%
2008	0.0%	-3.3%	-0.4%	7.9%
2009	-2.6%	-9.3%	1.6%	-4.9%
2010	2.9%	5.8%	2.9%	5.0%
2011	1.7%	3.9%	2.4%	7.8%
Average	1.7%	0.5%	2.4%	3.3%

Sources: Bureau of Economic Analysis (BEA), Bureau of Labor Statistic (BLS) and the Blue Chip Economic Indicators (BCIE)

Economic activity has historically increased sharply shortly after a recessionary period has ended due to increased consumption and employment. However, economic growth in the period after 2007 to 2009 recession has not fully conformed to historical trends as real GDP increased by 1.7% in 2011. Real GDP is forecasted to increase by 2.3% in 2012 and 2.6% in 2013, while Industrial Production is expected to increase by 3.9% in 2012 and 3.3% in 2013. Additionally, CPI has been forecasted to increase by 2.4% and 2.2% in 2012 and 2013, respectively.

In this manner, the PMOC’s updated escalation forecast for the Project has attempted to take into account the impact on factor prices as a result of the ongoing economic recovery in Hawaii and in the United States. These forecasts have also attempted to factor in the strong growth in Brazil, Russia, India and China (BRIC) and other emerging markets, which has a considerable impact on the demand for commodities and commodity prices. The PMOC’s cost escalation forecasts also incorporates the costs of transporting materials and services to Hawaii.

Except for professional services, the PMOC’s recommended escalation rates for 2011 would carry over to 2012 since economic conditions in the US remain largely unchanged since the previous forecast. Based on wage rate trends over the last ten years and updated information from the U.S. Bureau of Economic Analysis (BEA), the PMOC has revised its forecast with respect to professional services from 5.61% to 4.58%.

Table 26. PMOC’s Recommended Base Escalation Factors, 2012 to 2020

Cost Escalation Factor	PMOC Recommended Average Escalation Rate FY 2012 to FY 2020
Concrete	4.42%
Labor	3.71%
Other Materials	4.80%
Steel	5.91%
ROW	4.07%
Construction Equipment	3.00%
Vehicles (rail)	3.12%
Professional Services	4.58%

Source: Jacobs Consultancy

Concrete - The average annual increase in the PPI for concrete manufacturing from 1965 through February 2011 was 4.42%. The PMOC recommends using benchmark as the cost escalation factor for concrete and applied on a consistent basis throughout the forecast period.

Labor - The U.S. BEA reported that wages and income in the state of Hawaii increased by 8.31% from 1970 through 2009. These growth rates are indicative of rapid economic growth in Hawaii, particularly in the tourism and housing industries. In recent years, Hawaii's economy has matured with wages and income growth increasing at an average annual rate of 3.71% from 1990 to 2009. This estimate is in line with the 3.80% escalation rate that has been built in with the Project Labor Agreement (PLA) for construction contracts which is set to take effect in 2014.

Other Materials - The escalation rate developed by HART appears to be reasonable considering that U.S. CPI has increased by 3.43% per annum (including energy) from 1980 to 2010.

Steel - The forecasted escalation rate of 5.91% for steel combines the PPI for iron and steel 1967 to 2002 and the PPI for steel product manufacturing for purchased steel from 2003 to April 2011. Although this recommended escalation rate is above the 5.58% average in the HART Cash Flow model during the forecast period, it is below the escalation rates used for 2013 and 2014. Because the escalation rates from 2016 onward are below 5.60%, the PMOC recommends that HART revisit the escalation rates for 2016 onward if there are additional construction delays.

Right-of-Way (ROW) - The Standard & Poors'/Case-Shiller index for ten U.S. cities increased by 4.07% from January 1987 through March 2011. Although real estate and ROW prices tend to reflect local economic factors, this benchmark includes cities such as Los Angeles, San Diego and Miami, which have similar economic characteristics. It should be noted that HART is using a cost escalation rate of 4.53% in the Cash Flow Model which exceeds the PMOC's forecast.

Construction Equipment - The forecast of 3.00% per annum represents the average increase in the Producer Price Index (PPI) for construction equipment 2003 through May 2011.

Vehicles - The forecasted escalation represents the average increase for the Producer Price Index (PPI) for railroad equipment, which was 3.12% from 2001 to 2010.

Professional Services - The forecasted escalation rate of 4.58% reflects a weighted average of the average annual increase in professional services wages in Hawaii and the US compiled by the Bureau of Economic Analysis from 2001 to 2011. This weighted average has been estimated using the anticipated amount of professional services provided by local firms (25%) and by firms located on the US mainland (75%). Professional services cost at the national level have been relatively volatile with a -3.8% decrease in 2009 followed by a 3.0% increase in 2010 and a 7.0% increase in 2012. Within Hawaii, professional services costs have trended lower compared to the national average, with decreases of less 1% in 2009 and 2010 followed by a 2.1% increase in 2012. The continued reliance on professional services from firms based on the U.S. mainland would therefore justify using a higher escalation rate.

It should be noted that the 0.5% difference between the PMOC's revised rates and the annual escalation rates used in HART's Cash Flow Model results in an estimated \$10 million in higher costs for the project during the forecast period.

3.5 Adjusted Base Cost Estimate

The PMOC identified five (5) adjustments, four of which HART incorporated into the May 15th 2012 Budget Estimate revision. The fifth adjustment is for “Contractor Markup” which the PMOC incorporated into the cost estimate risk analysis model totaling \$15.24 million as listed below. The adjustment by SCC line item is listed below:

SCC 10 – Guideway and Track Elements

- No adjustment necessary

SCC 20 – Stations, Stops, Terminals, Intermodal Facilities (\$9.505 million total)

- SCC 20.01 – \$0.327 million adjustment (add)
- SCC 20.02 – \$9.178 million adjustment (add)

SCC 30 – Support Facilities: Yards, Shops & Admin. Building

- No adjustment necessary

SCC 40 – Sitework & Special Conditions (\$5.738 million total)

- SCC 40.01 – \$0.463 million adjustment (add)
- SCC 40.02 – \$4.168 million adjustment (add)
- SCC 40.03 – \$0.042 million adjustment (add)
- SCC 40.04 – \$0.545 million adjustment (add)
- SCC 40.07 – \$0.520 million adjustment (add)

SCC 50 – Systems

- No adjustment necessary

SCC 60 – Right-of-Way

- No adjustment necessary

SCC 70 – Vehicles

- No adjustment necessary

SCC 80 – Professional Services

- No adjustment necessary

The input for the Cost Risk Model and basis for the evaluation of project cost contingency is the Adjusted BCE, which is the BCE net of contingencies and finance costs and includes the PMOC adjustments (from June 20, 2012 SCC). To develop the Adjusted BCE (YOE), the following steps were taken:

- Grantee’s’ BCE – \$5,121,693,000
- Deduct Allocated Contingency – \$541,689,341
- Deduct Unallocated Contingency – \$101,871,000
- Deduct Latent Contingency – \$0

- Deduct YOE financing costs – \$173,058,000
- Apply PMOC Adjustments – \$15,243,343 (add)
- Adjusted BCE – \$4,320,318,002

Table 28 provides a summary of the 2011 BCE and Adjusted BCE for comparative purposes. Table 27 provides details of the current 2012 BCE.

Table 27. 2012 Adjusted BCE (YOE \$) with PMO Adjusts (June 20, 2012 SCC)

SCC	Description	BCE	Allocated Contingency	Total w/o Contingency	Adjustments	Adjusted BCE
10	Guideway & Track Elements	1,275,329,000	161,113,818	1,114,215,182	0	1,114,215,182
10.04	Guideway: Aerial structure	1,175,328,000	152,947,514	1,022,380,486	0	1,022,380,486
10.08	Guideway: Retained cut or fill	8,077,000	584,450	7,492,550	0	7,492,550
10.09	Track: Direct fixation	86,332,000	6,894,823	79,347,177	0	79,347,177
10.11	Track: Ballasted	3,551,000	256,910	3,294,090	0	3,294,090
10.12	Track: Special (switches, turnouts)	2,041,000	340,121	1,700,879	0	1,700,879
20	Stations, Stops, Terminals, Intermodals	506,166,000	84,360,947	421,805,053	9,505,345	431,310,398
20.01	At-grade station	7,334,000	1,222,266	6,111,734	327,096	6,438,830
20.02	Aerial station	353,476,000	58,912,691	294,563,309	9,178,249	303,741,558
20.06	Automobile parking multi-story structure	79,691,000	13,281,753	66,409,247	0	66,409,247
20.07	Elevators, escalators	65,665,000	10,944,237	54,720,763	0	54,720,763
30	Support Facilities: Yards, Shops, Admin.	99,425,000	6,890,443	92,534,557	0	92,534,557
30.02	Light Maintenance Facility	8,161,000	569,392	7,591,608	0	7,591,608
30.03	Heavy Maintenance Facility	40,907,000	2,807,751	38,099,249	0	38,099,249
30.04	Storage or Maintenance of Way Building	8,382,000	584,810	7,797,190	0	7,797,190
30.05	Yard and Yard Track	41,975,000	2,928,490	39,046,510	0	39,046,510
40	Sitework & Special Conditions	1,103,868,000	123,297,838	980,570,162	5,737,998	986,308,160
40.01	Demolition, Clearing, Earthwork	34,696,000	4,715,645	29,980,355	463,012	30,443,367
40.02	Site Utilities, Utility Relocation	350,695,000	51,245,046	299,449,954	4,167,939	303,617,893
40.03	Haz. mat'l, contam'd soil removal/ mitigation	7,229,000	638,393	6,590,607	41,931	6,632,538
40.04	Environmental mitigation	30,842,000	3,862,784	26,979,216	545,133	27,524,349
40.05	Site structures (retaining walls, sound walls)	8,638,000	638,622	7,999,378	0	7,999,378
40.06	Pedestrian / bike access, landscaping	48,263,000	7,188,919	41,074,081	0	41,074,081
40.07	Automobile, bus accessways (roads, parking)	212,536,000	30,556,812	181,979,188	519,983	182,499,171
40.08	Temporary Facilities/other indirect costs	410,969,000	24,451,617	386,517,383	0	386,517,383
50	Systems	247,461,000	26,176,478	221,284,522	0	221,284,522
50.01	Train control and signals	91,493,000	9,509,976	81,983,024	0	81,983,024
50.02	Traffic signals and crossing protection	12,524,000	2,065,784	10,458,216	0	10,458,216
50.03	Traction power supply: substations	32,874,000	3,373,007	29,500,993	0	29,500,993
50.04	Traction power distribution	36,426,000	3,548,136	32,877,864	0	32,877,864
50.05	Communications	59,889,000	6,197,895	53,691,105	0	53,691,105
50.06	Fare collection system and equipment	10,222,000	1,062,476	9,159,524	0	9,159,524
50.07	Central Control	4,033,000	419,024	3,613,976	0	3,613,976
	CONSTRUCTION SUBTOTAL (10 - 50)	3,232,249,000	401,839,524	2,830,409,476	15,243,343	2,845,652,819

SCC	Description	BCE	Allocated Contingency	Total w/o Contingency	Adjustments	Adjusted BCE
60	ROW, Land, Existing Improvements	221,188,000	24,790,439	197,397,561	0	197,397,561
60.01	Purchase or lease of real estate	201,659,000	22,298,243	179,360,757	0	179,360,757
60.02	Relocation of existing households/businesses	20,529,000	2,492,196	18,036,804	0	18,036,804
70	Vehicles	208,501,000	21,672,166	186,828,834	0	186,828,834
70.01	Light Rail	186,061,000	19,339,681	166,721,319	0	186,721,319
70.06	Non-revenue vehicles	16,011,000	1,664,243	14,346,757	0	14,346,757
70.07	Spare parts	6,429,000	668,242	5,760,758	0	5,760,758
80	Professional Services	1,183,826,000	93,387,212	1,090,438,788	0	1,090,438,788
80.01	Preliminary Engineering	95,120,000	1,065,222	94,054,778	0	94,054,778
80.02	Final Design	257,935,000	29,613,276	228,321,724	0	228,321,724
80.03	Project Management for Design/Construction	385,826,000	19,367,231	366,458,769	0	366,458,769
80.04	Construction Administration & Management	218,156,000	18,499,024	199,656,976	0	199,656,976
80.05	Professional Liability/Non-Construction Ins.	52,138,000	5,588,306	46,549,694	0	46,549,694
80.06	Legal; Permits; Review Fees by other agencies	76,135,000	8,494,119	67,640,881	0	67,640,881
80.07	Surveys, Testing, Investigation, Inspection	24,955,000	3,195,992	21,759,008	0	21,759,008
80.08	Start up	73,561,000	7,564,042	65,996,958	0	65,996,958
	SUBTOTAL (10 - 80)	4,846,764,000	541,689,341	4,305,074,669	15,243,000	4,320,318,002
90	Unallocated Contingency	101,871,000	101,871,000		0	
90	Latent Contingency				0	
	SUBTOTAL (10 - 90)	4,948,635,000	643,560,511		15,243,000	4,320,318,002
100	Finance Charges	173,058,000			0	
	TOTAL PROJECT COST (10 - 100)	5,121,693,000	643,560,511		15,243,000	4,320,318,002

Note: All numbers in 2012\$.

Table 28. 2011 Adjusted BCE (YOE \$) with PMOC Adjustments

SCC	Description	BCE	Allocated Contingency	Latent Contingency	Total Contingency	Total w/o Contingency	Adjustments	Adjusted BCE
10	Guideway & Track Elements	1,308,357,000	190,536,000	0	190,536,000	1,117,820,000	44,600,000	1,162,420,000
10.04	Guideway: Aerial structure	1,210,392,000	178,396,000	0	178,396,000	1,031,995,000	35,000,000	1,066,995,000
10.08	Guideway: Retained cut or fill	7,401,000	965,000	0	965,000	6,436,000	0	6,436,000
10.09	Track: Direct fixation	85,256,000	10,403,000	0	10,403,000	74,852,000	9,600,000	84,452,000
10.11	Track: Ballasted	3,102,000	404,000	0	404,000	2,697,000	0	2,697,000
10.12	Track: Special (switches, turnouts)	2,204,000	366,000	0	366,000	1,838,000	0	1,838,000
20	Stations, Stops, Terminals, Intermodals	614,602,000	103,170,000	25,131,000	128,301,000	486,300,000	20,202,000	506,502,000
20.01	At-grade station	8,345,000	1,418,000	0	1,418,000	6,926,000	323,000	7,250,000
20.02	Aerial station	449,606,000	75,779,000	18,569,000	94,349,000	355,256,000	19,878,000	375,134,000
20.06	Automobile parking multi-story structure	77,918,000	12,853,000	0	12,853,000	65,064,000	0	65,064,000
20.07	Elevators, escalators	78,732,000	13,117,000	6,561,000	19,679,000	59,053,000	0	59,053,000
30	Support Facilities: Yards, Shops, Admin.	103,805,000	11,942,000	0	11,942,000	91,863,000	447,000	92,310,000
30.02	Light Maintenance Facility	8,511,000	979,000	0	979,000	7,531,000	0	7,531,000
30.03	Heavy Maintenance Facility	42,778,000	4,921,000	0	4,921,000	37,857,000	0	37,857,000
30.04	Storage or Maintenance of Way Building	8,741,000	1,005,000	0	1,005,000	7,735,000	0	7,735,000
30.05	Yard and Yard Track	43,774,000	5,035,000	0	5,035,000	38,738,000	447,000	39,185,000
40	Sitework & Special Conditions	1,021,457,000	153,475,000	198,000	153,674,000	867,783,000	0	867,783,000
40.01	Demolition, Clearing, Earthwork	19,916,000	2,679,000	0	2,679,000	17,237,000	0	17,237,000
40.02	Site Utilities, Utility Relocation	358,376,000	67,161,000	0	67,161,000	291,214,000	0	291,214,000
40.03	Haz. mat'l, contam'd soil removal/ mitigation	7,533,000	811,000	0	811,000	6,721,000	0	6,721,000
40.04	Environmental mitigation	30,802,000	4,078,000	0	4,078,000	26,723,000	0	26,723,000
40.05	Site structures (retaining walls, sound walls)	22,935,000	3,159,000	0	3,159,000	19,776,000	0	19,776,000
40.06	Pedestrian / bike access, landscaping	44,675,000	7,136,000	198,000	7,335,000	37,339,000	0	37,339,000
40.07	Automobile, bus accessways (roads, parking)	212,928,000	31,598,000	0	31,598,000	181,330,000	0	181,330,000
40.08	Temporary Facilities/other indirect costs	324,289,000	36,849,000	0	36,849,000	287,439,000	0	287,439,000
50	Systems	251,586,000	28,379,000	0	28,379,000	223,207,000	20,000,000	243,207,000
50.01	Train control and signals	92,601,000	9,921,000	0	9,921,000	82,679,000	20,000,000	102,679,000
50.02	Traffic signals and crossing protection	13,043,000	2,315,000	0	2,315,000	10,727,000	0	10,727,000
50.03	Traction power supply: substations	33,800,000	3,632,000	0	3,632,000	30,168,000	0	30,168,000
50.04	Traction power distribution	37,347,000	4,489,000	0	4,489,000	32,857,000	0	32,857,000
50.05	Communications	60,602,000	6,499,000	0	6,499,000	54,102,000	0	54,102,000
50.06	Fare collection system and equipment	10,324,000	1,106,000	0	1,106,000	9,218,000	0	9,218,000
50.07	Central Control	3,868,000	414,000	0	414,000	3,453,000	0	3,453,000
	CONSTRUCTION SUBTOTAL (10 - 50)	3,299,809,000	487,504,000	25,330,000	512,834,000	2,786,974,000	85,249,000	2,872,223,000

SCC	Description	BCE	Allocated Contingency	Latent Contingency	Total Contingency	Total w/o Contingency	Adjustments	Adjusted BCE
60	ROW, Land, Existing Improvements	247,942,000	70,840,000	23,596,000	94,436,000	153,505,000	0	153,505,000
60.01	Purchase or lease of real estate	224,649,000	64,185,000	23,596,000	87,781,000	136,867,000	0	136,867,000
60.02	Relocation of existing households/businesses	23,293,000	6,655,000	0	6,655,000	16,637,000	0	16,637,000
70	Vehicles	212,461,000	22,763,000	0	22,763,000	189,697,000	0	189,697,000
70.01	Light Rail	191,657,000	20,534,000	0	20,534,000	171,122,000	0	171,122,000
70.06	Non-revenue vehicles	14,589,000	1,563,000	0	1,563,000	13,026,000	0	13,026,000
70.07	Spare parts	6,214,000	665,000	0	665,000	5,548,000	0	5,548,000
80	Professional Services	1,031,047,000	92,821,000	0	92,821,000	938,225,000	15,740,000	953,966,000
80.01	Preliminary Engineering	58,996,000	4,756,000	0	4,756,000	54,240,000	0	54,240,000
80.02	Final Design	222,177,000	22,403,000	0	22,403,000	199,774,000	1,600,000	201,374,000
80.03	Project Management for Design/Construction	350,329,000	28,507,000	0	28,507,000	321,822,000	1,000,000	322,822,000
80.04	Construction Administration & Management	187,914,000	17,083,000	0	17,083,000	170,831,000	0	170,831,000
80.05	Professional Liability/Non-Construction Ins.	56,103,000	5,100,000	0	5,100,000	51,003,000	9,499,000	60,503,000
80.06	Legal; Permits; Review Fees by other agencies	69,918,000	6,355,000	0	6,355,000	63,562,000	8,756,000	72,318,000
80.07	Surveys, Testing, Investigation, Inspection	6,072,000	527,000	0	527,000	5,545,000	0	5,545,000
80.08	Start up	79,534,000	8,088,000	0	8,088,000	71,445,000	(5,115,000)	66,330,000
	SUBTOTAL (10 - 80)	4,791,260,000	673,930,000	48,926,000	722,856,000	4,068,403,000	100,989,000	4,169,393,000
90	Unallocated Contingency	191,650,000	191,650,000	0	191,650,000	0	0	0
90	Latent Contingency	0	0	48,926,000	0	0	0	0
	SUBTOTAL (10 - 90)	4,982,910,000	865,580,000	48,926,000	914,506,000	4,068,403,000	100,989,000	4,169,393,000
100	Finance Charges	230,000,000	0	0	0	230,000,000	0	0
	TOTAL PROJECT COST (10 - 100)	5,212,910,000	865,580,000	48,926,000	914,506,000	4,298,403,000	100,989,000	4,169,393,000

Note: All numbers in 2011\$.

3.6 Project Cost Estimate Review Checklist

The table below includes Definitive Project Cost Estimate Review Checklist pursuant to the OP 33 Appendix D guideline. All items are addressed throughout this report and summarized below:

Table 29. Definitive Project Cost Estimate Review Checklist

Description	Yes	No	Comments
Review of Grantee's Cost Estimate			
Estimate was developed by those with substantial experience in the type of construction under consideration.	X		Grantee's estimators and consultants have relevant experience.
Sufficient judgment was applied to forecast design development, especially during early design stages.	X		Project is in advanced final design and three major design-build contracts are underway.
Evidence exist indicating sufficient collaboration with design team, especially in the application of value engineering.		X	VE workshops have occurred in two phases, but have not been fully implemented into the project.
Work Breakdown Structure has been formatted to conform to the FTA Standard Cost Categories.	X		Timberline software estimate is coded so it can be "cross-walked" into SCC Format.
SCC 10-50: Fixed Construction			
Construction Materials			
Quantities have been calculated with appropriate conservatism to accommodate development to a more advanced stage of design if appropriate.	X		
Allowances for material quantities have been included for commodities which cannot be fully quantified at the present level of design.	NA		Estimate is a bottoms-up style estimate with only minor allowances.
Unit Prices have been developed using the best available local market information.	X		Grantee adjusted unit prices from the DB contract awards. Grantee used mean and not the low bids, so an inherent conservatism exists in the unit prices.
Project sales tax exemption status has been established if appropriate and incorporated in materials costs.		X	No sales tax required in Hawaii, but the estimate includes the appropriate percentage for the General Excise Tax of 4.712% (GET).
Quotes have been obtained for specialty and price-sensitive materials.	X		Some quotes for specialty items have been received and long lead items: rail and special trackwork were awarded.
Material unit pricing reflects commodity/market volatility.	X		
Construction Labor			
Local wage rates, fringe benefits, and work rules are incorporated.	X		As stated in the Basis of Estimate and verified in the Timberline software estimate detail.
Local payroll taxes and insurance rates are incorporated.	X		As stated in the Basis of Estimate and verified in the Timberline software estimate detail.
Holiday / show-up / vacation pay is incorporated.	X		As stated in the Basis of Estimate and verified in the Timberline software estimate detail.
Crew productivity is appropriate and conservative for the task under evaluation.	X		As stated in the Basis of Estimate and verified in the Timberline software estimate detail.
Availability and variability of utility and railroad outages and "track time" have been incorporated in a conservative manner in determining the crew productivities for impacted work.	X		This applies to future phases of work, but the Grantee developed construction strategies to avoid this issue, such as extending alignment past set coordination or end of construction points.
Construction Equipment			

Description	Yes	No	Comments
Local equipment rental rates and current fuel costs are incorporated.	X		As stated in the Basis of Estimate and verified in the Timberline software cost estimate detail.
Quotes have been obtained for specialty equipment (TBM's, etc) and currency adjustments as applicable have been made.	X		The main specialty equipment is the casting yards, oversize drill pier rigs, and gantry cranes necessary for elevated guideway segments. These are based on recent quotations from successful bidders.
Escalation			
Confirm that adequate escalation rates have been applied to estimates of material, labor and equipment costs to anticipate prices at the time of project bid. Cost escalation can be due to increased global or local demand (commodity volatility, supply restrictions based on global demand or natural disaster events).	X		PMOC economist reviewed escalation factors and found them to be reasonable. At least 43% of the work is under contract, which mitigates some risk from escalation uncertainty. Initial PMOC concerns have been addressed with subsequent grantee revisions and adjustments.
Special Considerations			
Utility and Railroad labor, equipment, and overhead rates have been verified and incorporated in third party or "force account" work pricing, as well as local utility/RR work and safety rules.	X		
Special consideration has been given to support operations and facilities for tunneling operations, facilities to support operations in contaminated/hazardous materials, etc.	X		
Construction Indirect Costs, Multipliers for Risks			
Contractor indirect and overhead costs are advanced beyond a percent of the associated construction direct costs and should be analyzed based on field and home office indirect costs such as contract duration, appropriate levels of staffing (including project managers, engineers, safety engineers, schedulers, superintendents, QA/QC engineers, craft general foreman, labor stewards / nonproductive labor, warehousing, project trucking, survey layout, purchasing, timekeeping, etc.), mobilization / demobilization costs, equipment standby / idle time costs, reviewer office / lab / tool facilities, safety equipment, QA/QC testing equipment, temporary utilities (sanitary / power / light / heat), jobsite and public security measures, etc.	X		PMOC reviewed percentages utilized within the project estimate. As noted previously 52% of the work is bid. However, PMOC determined markup for Station & other contracts was missing the prime contractor markup and thus an upward adjustment was included.
Appropriate costs have been included for payment and performance bonds and special insurance requirements (RR protective, pollution liability, etc.).	X		
Other construction insurance costs and/or project-wide coverage (Owner Controlled Insurance Policy) has been included based on quotes from appropriate carriers.	X		An adjustment was made to the estimate as the grantee decided to use the OCIP methods. This was contrary to the insurance included in already awarded contracts and certain portions of the bid.
Contractor profit / risk costs have been incorporated that reflect the expected level of competition by contract package (higher profit margin where few competitors will bid).	X		This is a potential risk as Kiewit was the successful bidder on the first two guideway contracts and could have an advantage.

Description	Yes	No	Comments
SCC 60 – Real Estate			
Costs for professional services (contracted and in-house legal, appraisal, real estate and relocation consultants) and costs for the real estate and relocations themselves have been included. Check that easements, acquisitions, inspections, takings, etc. have been appraised or estimated by qualified professionals familiar with local real estate markets and practices. Include costs for taxes.	X		PMOC worked with HART staff as the detailed estimate did not match the SCC summary and additional documentation was provided. It was eventually determined a sufficient value for the SCC was included in the estimate.
SCC 70 – Vehicles			
Costs for professional services (both contracted and in-house) for vehicle design and procurement as well as construction of prototypes and vehicles. Review estimates for current purchase prices for similar vehicles or quoted prices from manufacturers; costs for spare parts and project requirements for non-revenue support vehicles are included.	X		The work is included in CSC, which is under contract.
SCC 80 – Professional Services			
Costs both contracted and in-house for all professional, technical & management services related to the design & construction of fixed infrastructure (Cats. 10 - 50) during the preliminary engineering, final design, construction, and closeout phases of the project. This includes environmental work, surveying, geotechnical investigations, design, engineering and architectural services; materials & soils testing during construction; specialty services such as safety or security analyses; value engineering, risk assessment, cost estimating, scheduling, Before & After studies, ridership modeling and analyses, auditing, legal services, administration & management, etc. by agency staff or outside consultants. Professional liability insurance & other non-construction insurance should be included in SCC 80.05.	X		
Confirm that cost estimates are based on realistic levels of staffing for the duration of the project.	X		PMOC reviewed grantee’s staffing plans against the Project Schedule and the work scope, and determined it is reasonable
Confirm that costs for permitting, agency review fees, legal fees, etc. are included.	X		
Allocated Contingency			
Confirm that adequate contingency has been allocated to each of the SCC categories supported by traceable risk assessment.	X		This was confirmed by the Risk Assessment analysis.
SCC 90 – Unallocated Contingency			
Confirm that adequate contingency has been added to the total project cost supported by traceable risk assessment.	X		This was confirmed by the Risk Assessment analysis.
SCC 100 – Finance Charges			
Confirm that finance charges are included if necessary. Ensure that the Grantee and FTA’s Financial Management Oversight Contractor review the reasonableness of the amount of finance charges.	X		Grantee included \$177.2 million in YOES\$.

Description	Yes	No	Comments
Escalation			
Confirm that adequate inflation rates have been applied to Base Year project costs to anticipate costs at procurement or bid. The Year of Expenditure costs should be developed with traceable and supportable assumptions. Reference indices that may be useful are the ENR Building Cost Index and Construction Cost Index, some with regional cost databases.	X		Grantee and PMOC economist agreed to the applicable percentages. Grantee provided an Excel Spreadsheet that was reviewed and deemed acceptable. As noted in the report the SCC Summary workbook was not complete in standard FTA format and this will need to be submitted prior to FFGA.

3.7 Findings

- (1) The PMOC concludes that the estimate is consistent with the project scope identified in the FEIS and ROD.
- (2) The PMOC has characterized the project cost data as an AACE “Class 2” estimate due to the bottoms-up style of estimate and receipt of bids for design build portions of the project scope. To date, the grantee has awarded \$2.562 billion of the \$4.983 billion of planned contracts, or 51.8%, including \$178.1 million in allocated contingency. Without considering allocated contingency, the percentage is 54.3%.
- (3) Soundness & reliability of the Grantee’s Estimate – The grantee’s *2012 SCC Estimate* was prepared utilizing standard industry practices combined with highly regarded Timberline estimating software and a reasonable and reliable data base. The database contains adjusted local rates which include constructions, environmental, real estate, permitting, bonds, insurance, and related general conditions and soft cost markup factors. It has been proven reliable thus far, as awards of approximately 52% of the planned contracts have occurred. The project budget has been reviewed by the PMOC for congruence, incorporation and coordination of the project scope & schedule, and found to fall within a reasonable range.
- (4) The PMOC accepts the percentages used by the grantee for escalation in its *2012 SCC Estimate*.
- (5) The PMOC verified that the grantee appropriately included the General Excise Tax in its estimate as it has not received exemption from this requirement.
- (6) The PMOC verified that the grantee included an appropriate level of detail and supportable justification in the Basis of Estimate for general condition costs.
- (7) The cost estimate contained some line item “Allowance” costs which contained minimal quantification or detail backup. The Allowance line item total just under \$580 million or 11.71% of the total Project estimate. The PMOC found the use of Allowance line items acceptable and not excessive for a cost estimate prepared prior to entry into the FFGA as lower level details exist as explained in separate paragraphs of this report. (See the appropriate section as most allowance values

are supported by separate detailed estimates)

- (8) The PMOC evaluated the design-build bids and the grantee's approach for contract evaluation, post bid analysis and award.
 - The grantee has awarded two design-build guideway sections; one was substantially less than the engineer's estimate (WOFH); and, one was not (KH). The MSF bid was within the budget, and the DBOM contract for the CSC was less than the estimate. However, risk still exists for these projects due to pending court cases for the CSC bid and delays in NTPs for the remaining bids. The PMOC accounted for these risks in its analysis sensitive to the information available at the time of the modeling.
 - The grantee is following their outlined procurement process, which has proven successful to date.
 - Because the bids are prepared using lump sum line items, the SCC format distributions are provided after NTP, which make spot checking awarded contract line item quantification and unit pricing difficult.
- (9) With the exception of the adjustment of \$15.24 million for "Contractor Markups", the PMOC has determined the current cost estimate (revised May 15th Estimate) to be mechanically and fundamentally sound and reasonable and that it meets the FTA guidance and requirements necessary for an FFGA. The \$15.24 million in PMOC adjustments are addressed separately in the OP 40 Risk Analysis report and utilized to determine an appropriate required project contingency. The grantee's *2012 SCC Estimate* was prepared utilizing standard industry practices combined with highly regarded Timberline estimating software and a reasonable and reliable data base. The estimate is substantiated in part from bid results obtained from the award of the design-build portions of the work during 2010/2011. The \$2.5 billion in aggregate contract value awarded to date is approximately 52% of the project's contract value, including contingency as shown in Table 15 of this report.
- (10) The PMOC has determined that the cost estimate contingency amounts do not sufficiently cover similar items that lack definitive information at this phase of the Project and will address this issue separately in the OP40 Report.
- (11) The escalation rate used by HART for professional services is below average when compared to US mainland professional services historical data. In recent years, wage rates for professional services have increased at a faster rate nationally as compared to the State of Hawaii. The PMOC estimates that a 0.5% difference in escalation rates for professional services could result in \$10 million in higher costs, overall.

3.8 Recommendations

- (1) The grantee should incorporate the adjustment for the "Construction Markup" as identified during the PMOC Risk Assessment Workshop, which totals \$15.24 million (additive). The revised HART estimate of May 15, 2012 contains the Cost Reduction

Measures and some of the proposed PMOC adjustments such as the Real Estate, GET Tax for Escalators/Elevators and Escalation recommendations. The PMOC included this adjustment in the OP40 Cost Risk Analysis as an adjustment to the grantee's estimate.

- (2) The grantee should address any cost-related issues regarding slippage of Notice to Proceed (NTP) dates for the selected or awarded design-build contracts. The HART June 20, 2012 SCC Estimate, as supported by details in HART's Cash Flow and as shown in Table 5 of this report, included \$89.6 million for pending change orders. This value includes some costs for potential delays. However, until these pending change orders become final, the cost is not set.
- (3) The grantee should continue to incorporate and implement the accepted VE proposals for the Stations and Airport/City Center segments.
- (4) The grantee should improve implementation of internal quality control and review of General Engineering Consultant (GEC) developed deliverables (cost estimates) prior to their issuance to the FTA/PMOC. The PMOC noted similar issues with the schedule and related project control deliverables as they lacked consistency with naming conventions, transmittal protocol, and incomplete information
- (5) The grantee should revise its staffing plan when major revisions are made to the Project scope, schedule or budget, or when major project phases are complete (e.g. completion of major DB contracts) in order to synchronize resource allocation planning. Major revisions include significant delay to contract letting or execution, contract package revisions, changes to contract delivery methods, etc., or the addition of professional service contracts, etc.
- (6) Oversight is needed for the implementation of professional services contracts to ensure that costs do not increase significantly during project development.

APPENDICES

Appendix A: List of Acronyms

A	▪ Ampere
AA	▪ Alternatives Analysis
AACE	▪ Association for the Advancement of Cost Engineering
AC	▪ Alternating Current
ACT ID	▪ Activity Identification
ADA	▪ Americans with Disabilities Act
AHJV	▪ Ansaldo Honolulu Joint Venture
ANSI	▪ American National Standards Institute
APB	▪ Absolute Permissive Block
APS	▪ Adjusted Project Schedule
APTA	▪ American Public Transportation Association
ASCE	▪ American Society of Civil Engineers
ASHRAE	▪ American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	▪ American Society of Mechanical Engineers
ASTM	▪ ASTM International, nee, American Society for Testing and Materials
ATC	▪ Alternative Technical Concept
ATC	▪ Automatic Train Control
ATO	▪ Automatic Train Operation
BAFO	▪ Best and Final Offers
BCE	▪ Base Cost Estimate
BEA	▪ Bureau of Economic Analysis
BFMP	▪ Bus Fleet Management Plan
BLS	▪ Bureau of Labor Statistics
BOS	▪ Basis of Schedule
BRF	▪ Beta Risk Factor
BRIC	▪ Brazil, Russia, India and China
CBTC	▪ Communications-Based Train Control
CC	▪ Community College
CE&I	▪ Construction Engineering and Inspection
CER	▪ Cost Estimating Relationship
CIH	▪ Central Instrument Hut
CIL	▪ Central Instrument Location
CIR	▪ Central Instrument Room
CMP	▪ Configuration Management Plan
CMS	▪ Document Management System
COTS	▪ Commercial off-the-Shelf
CPI	▪ Consumer Price Index
CPM	▪ Critical Path Method
CPP	▪ Contract Packaging Plan
CPS	▪ Construction Project Schedule
CPS	▪ Current Probable Schedule
CSC	▪ Core Systems Contract
DB	▪ Design-Build
DBB	▪ Design-Bid-Build
DBEDT	▪ Hawaii Department of Business Economic Development and Tourism
DBOM	▪ Design-Build-Operate-Maintain
DC	▪ Direct Current
DEIS	▪ Draft Environmental Impact Statement
DHHL	▪ Department of Hawaiian Homelands
DOT	▪ United States Department of Transportation
DTS	▪ Department of Transportation Services

ECP	▪ Environmental Condition of Property
EDC	▪ Engineering Design Consultant
EIS	▪ Environmental Impact Statement
ENR	▪ Engineering News Record
ERTMS	▪ European Rail Traffic Management System
EUM	▪ Estimate Uncertainty Model
FAA	▪ Federal Aviation Administration
FAQ	▪ Frequently Asked Questions
FD	▪ Final Design
FEIS	▪ Final Environmental Impact Statement
FF	▪ Finish-Finish
FFGA	▪ Full Funding Grant Agreement
FMOC	▪ Financial Management Oversight Consultant
FS	▪ Finish-Start
ft	▪ Foot
FTA	▪ Federal Transit Administration
FY	▪ Fiscal Year
GBS	▪ Gap Breaker Station
GDP	▪ Gross Domestic Product
GEC	▪ General Engineering Consultant
GET	▪ General Excise Tax
GPRM	▪ Great Pacific Rocky Mountain
HART	▪ Honolulu Authority for Rapid Transportation
HDOT	▪ Hawaii Department of Transportation
HECO	▪ Hawaiian Electric Company
HHCTCP	▪ Honolulu High Capacity Transit Corridor Project
HNL	▪ Honolulu International Airport
HVAC	▪ Heating, Ventilating, and Air Conditioning
ICD	▪ Interface Control Document
IEEE	▪ Institute of Electrical and Electronics Engineers
IPS	▪ Integrated Project Schedule
IRM	▪ Impacted Risk Model
KH (or KHG)	▪ Kamehameha Highway (or Kamehameha Highway Guideway)
kW	▪ Kilowatt
LCD	▪ Liquid Crystal Diode
LONP	▪ Letter of No Prejudice
LPA	▪ Locally Preferred Alternative
LV	▪ Low Voltage
M&I	▪ Manufacture and Install
MDBCF	▪ Mean Distance between Component Failure
MFPR	▪ Multifunction Protective Relay
MIL	▪ Military Specification
MOS	▪ Minimum Operating Segment
MOT	▪ Maintenance of Traffic
mph	▪ Miles Per Hour
mphps	▪ Miles Per Hour Per Second
MPS	▪ Master Project Schedule
MS	▪ Microsoft
MSF	▪ Maintenance and Storage Facility
MSS	▪ Master Summary Schedule
MTTR	▪ Mean Time to Repair
MVA	▪ Mega Volt Ampere
MW	▪ Megawatt
NBER	▪ National Bureau of Economic Research
NEMA	▪ National Electrical Manufacturers Association
NEPA	▪ National Environmental Policy Act

NFPA	▪ National Fire Protection Association
NGD	▪ Negative Grounding Device
NTP	▪ Notice to Proceed
O&M	▪ Operations and Maintenance
OBS	▪ Organizational Breakdown Structure
OCC	▪ Operations Control Center
OCIP	▪ Owner Controlled Insurance Program
OCS	▪ Overhead Contact System
OD	▪ Original Duration
OD	▪ Original Duration
OP	▪ Oversight Procedure
PA	▪ Programmatic Agreement
PB	▪ Parsons Brinckerhoff
PE	▪ Preliminary Engineering
PHF	▪ Peak Hour Factor
PLA	▪ Project Labor Agreement
PLC	▪ Programmable Logic Controller
PMBOK	▪ Project Management Institute's Body of Knowledge
PMC	▪ Project Management Support Consultant
PMO	▪ Project Management Oversight
PMOC	▪ Project Management Oversight Contractor
PMP	▪ Project Management Plan
PPI	▪ Producer Price Index
QA/QC	▪ Quality Assurance/Quality Control
QMP	▪ Quality Management Plan
RA	▪ Risk Assessment
RAM	▪ Responsibility Assignment Matrix
RAMP	▪ Real Estate Acquisition and Management Plan
RBC CBTC	▪ Radio Block-Centered Communications-Based Train Control
RCMP	▪ Risk and Contingency Management Plan
RFMP	▪ Rail Fleet Management Plan
RFP	▪ Request for Proposals
rms	▪ Root Mean Squared
ROD	▪ Record of Decision
ROW	▪ Right-of-Way
RSD	▪ Revenue Service Date
RTD	▪ Rapid Transit Division
SBS	▪ Schedule Breakdown Structure
SCC	▪ Standard Cost Category
SF	▪ Start-Finish
SOA	▪ State Oversight Agency
SS	▪ Start-Start
SSCP	▪ Safety and Security Certification Plan
SSMP	▪ Safety and Security Management Plan
TC	▪ Train Control
TC&C	▪ Technical Capacity and Capability
TCCR	▪ Train Control and Communications Room
TCRP	▪ Transit Cooperative Research Program
TES	▪ Train Electrification System
TPM	▪ Office of Program Management
TPSS	▪ Traction Power Substation
TRB	▪ Transportation Research Board
TRU	▪ Transformer-Rectifier Unit
TVM	▪ Ticket Vending Machine
UH	▪ University of Hawaii
UHERO	▪ University of Hawaii Economic Research Organization

UL	▪ Underwriters Laboratories
UPS	▪ Uninterruptible Power Supply
US	▪ United States of America
USB	▪ Universal Service Bus
USDOT	▪ United States Department of Transportation
USN	▪ United States Navy
V	▪ Volt
UITP	▪ International Association of Public Transport and
UTO	▪ Unattended Train Operation
VDC	▪ Volts, Direct Current
VE	▪ Value Engineering
VTA	▪ Verification, Test, and Acceptance
WBS	▪ Work Breakdown Structure
WOFH	▪ West Oahu/Farrington Highway
YOE	▪ Year of Expenditure

Note: The above list includes all acronyms identified in the various OP deliverables.

Appendix B: Documents Reviewed

Document	Rev. No.	Date
Management Plans/Administrative		
Final Environmental Impact Statement (FEIS)	-	25-Jun-10
Programmatic Agreement (PA)	-	18-Jan-11
Record of Decision (ROD)	-	18-Jan-11
Project Management Plan (PMP)	5.0	29-Jun-12
Quality Management Plan (QMP)	1	05-Feb-12
Real Estate Acquisition and Management Plan (RAMP)	5	31-Jan-12
Bus Fleet Management Plan (BFMP)	3	Mar-12
Rail Fleet Management Plan (RFMP)	0.1	Mar-12
Safety and Security Management Plan (SSMP)	3A	28-Feb-12
Safety and Security Certification Plan (SSCP)	2A	01-Mar-12
Configuration Management Plan	0.2	07-Feb-12
Staffing and Succession Plan	5	25-May-12
Operating Plan	0.2	29-Jun-12
Force Account Plan	0.3	05-Jan-12
Mitigation Monitoring Program	0	15-Mar-12
Interface Management Plan	0.1	17-Jan-12
Risk Contingency Management Plan	0	29-Jun-12
Contract Packaging Plan	3	30-Mar-12
Claims Avoidance Plan	0.1	24-Jan-12
Construction Management Plan (CMP)	0.1	03-Feb-12
Contract Resident Engineer Manuals (DB & DBOM)	0.1	Feb-12
Contract Resident Engineer Manual (DBB)	A	15-Feb-12
1.PP-01 – Procedures Index	0	15-Mar-12
1.PP-02 – Procedure Development Process	0.1	12-Mar-12
1.PP-03 – Standard Terms, definitions, and Acronyms	0.1	12-Mar-12
1.PP-04 – Baseline Documents Revision and Control	0.1	12-Mar-12
1.PP-05 – Identification of Badge Policy	0.1	15-Mar-12
2.PA-01 – Security Sensitive Information (SSI)	0.1	12-Mar-12
2.PA-02 – Procurement Control	0.1	12-Mar-12
2.PA-03 – Email Management	0.1	12-Mar-12
2.PA-04 – Project Wide Document Control	0.1	12-Mar-12
2.PA-05 – Project Library	0.1	12-Mar-12
2.PA-06 – Community Relations and Media Contacts	0.1	12-Mar-12
2.PA-07 – RTD Training Procedure	0.1	12-Mar-12
2.PA-08 – Policy for Safeguarding Protected Information	0.1	12-Mar-12
2.PA-09 – Permit Procedures	0	15-May-12
3.PM-01 – Contract Management System	1.1	14-Mar-12
3.PM-04 – Public Information Communication	0.1	15-Mar-12
3.PM-05 Meeting/Minutes	2.1	12-Mar-12
4.PC-02 – Project Management Control	0.1	15-Mar-12
4.PC-03 – Project Progress Reports	0.1	15-Mar-12
4.PC-04 – Program Scheduling	0.1	15-Mar-12
4.PC-05 – Project Accounting	0.1	12-Mar-12
4.PC-06 – Cost Estimating	0.1	12-Mar-12
4.PC-07 – Cost Control	0.1	12-Mar-12
4.PC-08 – Risk Management	0.1	12-Mar-12
4.PC-09 – Contingency Management	1	15-Mar-12
5.CA-01 – Contract Administration	0.1	15-Mar-12
5.CA-02 – Contract Change Management	0.1	14-Mar-12

Document	Rev. No.	Date
5.CA-03 – Contractor Progress Payments	0.1	13-Mar-12
5.CA-04 – Contractor Progress Reports	0.1	13-Mar-12
5.CA-05 – Contract Change Orders	0.1	13-Mar-12
5.CA-06 – Contract Closeout	0.1	13-Mar-12
5.CA-07 – Claims and Disputes Resolution	0.2	14-Mar-12
5.CA-08 – CACO and Contract Amendment Procedure	0	14-Mar-12
6.CM-01 – Submittal Procedure	1.1	14-Mar-12
6.CM-02 – RFI Procedure	2.1	14-Mar-12
6.CM-03 – RFC Procedure	0.2	14-Mar-12
6.CM-05 – Interface Management and Coordination Procedure	0.1	12-Mar-12
7.GA-01 – Board – Staff Interaction	0	17-July-11
7.GA-04 – Petty Cash Fund	0	17-July-11
7.GA-06 - Travel	0	17-July-11
7.GA-07 – Preparation of Board Materials	0	20-July-11
Technical		
Design Criteria		
Chapter 1 – General		15-Mar-12
Chapter 2 – Operations		15-Mar-12
Chapter 3 – Environmental Considerations		15-Mar-12
Chapter 4 – Track Alignment and Vehicle Clearances		14-Feb-12
Chapter 5 – Trackwork		15-Mar-12
Chapter 6 – Civil		15-Mar-12
Chapter 7 – Traffic		15-Mar-12
Chapter 8 – Utilities		15-Mar-12
Chapter 9 – Structural		15-Mar-12
Chapter 10 – Architecture		10-Feb-12
Chapter 11 – Landscape Architecture		15-Mar-12
Chapter 12 – Passenger Vehicles		10-Feb-12
Chapter 13 – Traction Electrification		15-Mar-12
Chapter 14 – Train Control		15-Mar-12
Chapter 15 – Communications and Control		15-Mar-12
Chapter 16 – Fare Vending		15-Mar-12
Chapter 17 – Corrosion Control		15-Mar-12
Chapter 18 – Maintenance & Storage Facilities (MSF)		14-Feb-12
Chapter 19 – Facilities Mechanical		15-Mar-12
Chapter 20 – Facilities Electrical		15-Mar-12
Chapter 21 – Fire and Intrusion Alarm Systems		15-Mar-12
Chapter 22 – Elevators and Escalators		15-Mar-12
Chapter 23 – Fire/Life Safety		15-Mar-12
Chapter 24 – Systems Assurance		10-Feb-12
Chapter 25 – System Safety and Security		15-Mar-12
Chapter 26 – Sustainability		14-Feb-12
HART Directive Drawings		3-Nov-10
H RTP Standard Specifications		15-Feb-12
West Oahu/Farrington Station Highway Final Design Drawings		Various
Geotechnical Data Report (WOFH)		27-Mar-09
Supplement to Geotechnical Data Report (WOFH)		15-May-09
Geotechnical Baseline Report (WOFH)	2.0	Aug-09
Kamehameha Highway Interim Design, Advanced Interim Design, and Final Design Drawings		Various
Kamehameha Highway Segment Geotechnical Baseline Report	1.1	07-May-10
Kamehameha Highway Geotechnical Data Report		16-Feb-10

Document	Rev. No.	Date
Kamehameha Highway Geotechnical Data Report Addendum		7-May-10
Airport Preliminary Engineering Drawings, Volumes 1-3		1-Oct-10
Airport Geotechnical Data Report		8-Feb-10
Airport Fixed-Guideway Foundation Technical Memorandum		6-Feb-10
City Center Preliminary Engineering Drawings, Volumes 1-4		6-Oct-10
City Center Geotechnical Data Report		26-Feb-10
City Center Fixed-Guideway Foundation Technical Memorandum		26-Feb-10
East Kapolei Station Updated Design Plans		9-Mar-12
UH West Oahu Station Updated Design Plans		9-Mar-12
Hoopili Station Updated Design Plans		9-Mar-12
West Loch Station In-Progress Submission		29-Feb-12
Waipahu Transit Center Station In-Progress Submission		29-Feb-12
Leeward Community College Station In-Progress Submission		29-Feb-12
Pearl Highlands Station Updated Design Plans		9-Mar-12
Pearlridge Station Updated Design Plans		9-Mar-12
Aloha Stadium Station Updated Design Plans		9-Mar-12
Airport Station Group Updated Design Plans		9-Mar-12
Dillingham Station Group Undated Design Plans		9-Mar-12
Kaka'ako Station Group Updated Design Plans		9-Mar-12
Ala Moana Station Updated Design Plans		9-Mar-12
Guideway Superstructure Study – Summary Report		22-May-08
Structures Workshop Summary Report		7-10-Jan-08
Systems Workshop Presentation		22-Aug-08
Transportation Technical Report		1-Aug-08
Construction Workshop Frequently Asked Questions (FAQ)		12-Jun-08
Construction Workshop Presentation		12-Jun-08
Environment Condition of Property, NAVFAC (Navy Drum Site)		Mar-09
Final Evaluation of Project Delivery Options		2-Nov-06
Fixed Guideway Fleet Sizing Report		Jun-09
Value Engineering – Stations Report		Sep-10
Value Enhancement Summary Report		Sep-10
Contracts		
West Oahu/Farrington Highway Design-Build – RFP, Addenda, Proposal and Contract Documents		Various
Kamehameha Highway Design-Build – RFP, Addenda, Proposal and Contract Documents		Various
Maintenance and Storage Facility Design-Build – RFP, Addenda, Proposal and Contract Documents		Various
Core Systems DBOM – RFP, Addenda, Proposal and Contract Documents		Various
General Conditions of Design-Build Contracts, Honolulu		Feb-09
Financial/Cost		
FFGA Capital Cost Estimate Basis and Assumptions		9-May-12
FFGA Main Worksheet – Build Alternative		14-May-12
FFGA Cash Flows Worksheet		14-May-12
FFGA H RTP SCC Cost Workbook		14-May-12
HART Capital Cost by Contract by SCC Workbook		20-Mar-12
Price Proposals (post bid) Kiewit WOFH		11-Nov-09
Price Proposals (post bid) Kiewit MSF		16-Mar-11
Price Proposals (post bid) Kiewit Kamehameha		16-Mar-11
Price Proposals (post bid) Ansaldo Core Systems		16-Mar-11
General Excise and Use Tax in Hawaii		16-Feb-06
Schedule		

Document	Rev. No.	Date
HRTP Baseline Progress Schedule REV.04.xer		13-Jun-12
HART FFGA BASELINE PMOC Review.plf		13-Jun-12
Basis of Schedule 062012.pdf (Rev 3.0)	3.0	20-Jun-12

Note: The above list includes all key documents reviewed by the PMOC for preparation of the various OP deliverables.