



HONOLULU AUTHORITY FOR RAPID TRANSPORTATION

**Board of Directors Meeting
Ali'i Place, Suite 150
1099 Alakea Street
Honolulu, Hawaii 96813
Thursday, September 11, 2014 8:30 am**

MINUTES

PRESENT:	Ivan Lui-Kwan Donald G. Horner Michael Formby Keslie Hui	William "Buzz" Hong Carrie Okinaga Robert "Bobby" Bunda
ALSO IN ATTENDANCE: (Sign-In Sheet and Staff)	Daniel Grabauskas Brennon Morioka Diane Arakaki Michael McGrane Duane Sayers David Sagherian Gary Takeuchi Joyce Oliveira Kate Froemming	Lorenzo Garrido Russell Honma Gail Jennings Allison Gammel Cindy Matsushita Joyce Oliveira Andrea Tantoco Karley Halsted
EXCUSED:	George Atta Damien Kim	Ford Fuchigami

I. Call to Order by Chair

HART Board Chair Ivan Lui-Kwan called the meeting to order at 8:37 a.m.

Mr. Lui-Kwan called for a moment of silence in remembrance of the events of September 11, 2001.

II. Public Testimony on All Agenda Items

Mr. Lui-Kwan called for public testimony.

Dan Purcell provided testimony complimenting HART on its transparency. He suggested that HART engage in a public discussion regarding any energy plan it may develop. Mr.

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Purcell also advised the Board of the shortage of lattice boom crane operators, and the resulting possibility of overtime for those workers.

III. Approval of the Minutes of the August 14, 2014 Board of Directors Meeting

Mr. Lui-Kwan called for the approval of the August 14, 2014 minutes of the meeting of the Board of Directors.

Board member Robert "Bobby" Bunda thanked Vice Chair Donald Horner for his open discussion on the Westside Stations bid, as reflected in the minutes.

There being no objections, the minutes were unanimously approved.

IV. Right of Way Update

HART Executive Director and CEO Daniel Grabauskas said that Director of Planning and Right of Way Elizabeth Scanlon and Deputy Director of Right of Way Morris Atta would be updating the Board on progress in real estate acquisitions. He said that staff had added new charts for more information and transparency. A copy of the presentation is attached hereto as Attachment A.

Mr. Atta reported that, related to concerns expressed by the Board, real estate consultant Paragon had hired local acquisition agents and contractors and planned to hire local clerical support. Board member Keslie Hui asked whether Paragon's housing expenses were lower as result of local hires. Mr. Atta said that Paragon is utilizing longer term rentals to lower housing costs, which are subject to a cap under the contract.

Mr. Atta said that to date, 71% of the total land area needed is available to HART's contractors. He also offered an update on the status of appraisals and offers made by parcel, with the City Center section containing the most outstanding parcels. Mr. Atta illustrated the status of acquisitions according to taking type – full or partial taking. He reported that three offers had been accepted since the previous month, and provided a summary of all acquisitions to date.

Mr. Lui-Kwan asked about the likelihood of meeting HART's goal of site control of all properties by end of the year. Mr. Atta responded that HART would be able to achieve a significant part of the goal, but that some acquisitions would be completed in early 2015.

Mr. Lui-Kwan asked Mr. Grabauskas about the impact of the real estate acquisition progress on the recent developments in the Westside Stations procurement. Mr. Grabauskas said that HART is on course to make the necessary properties available for the construction of the east portion of the guideway, which would go out for bid in the first quarter of 2015.

Mr. Lui-Kwan asked about staff's experiences working with consultant Paragon. Mr. Atta reported a good working relationship between HART and Paragon.

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Ms. Okinaga asked about apparent anomalies in acquisition costs that exceeded the budget. Mr. Atta responded that those anomalies were partial takes that had been converted to full takes. Board member Donald Horner reiterated his request to indicate such in future presentations.

Mr. Horner asked whether the right of way program was still within the Full Funding Grant Agreement (FFGA) budget, and Mr. Atta responded that it was.

Mr. Hui noted that it would be helpful to indicate that a significant number of parcels are owned by a few landowners. Mr. Horner added that many parcels are government owned. Ms. Scanlon agreed, and said that future presentations would include the number of parcels and the number of landowners.

Mr. Horner asked about acquisitions in the Airport section. Mr. Atta said that HART was working on agreements with the State Department of Transportation (HDOT), the U.S. Postal Service, and the Navy for easements. He said that most of the acquisitions in the Airport section, which goes from the Aloha Stadium station to the Middle Street station, involve government landowners.

Mr. Hui asked that staff delineate the difference between completed acquisitions and properties for which HART had obtained site access. Mr. Atta and Ms. Scanlon committed to doing so.

Board member Michael Formby asked that staff report on challenging acquisitions that could impact schedule. Mr. Atta replied that HART was developing a matrix showing the status of acquisitions, including the challenging acquisitions, so that contractors can assess their risk vis-à-vis the schedule.

Board member William "Buzz" Hong asked about HART's eminent domain schedule. Mr. Atta replied that HART will have a better idea of possible eminent domain properties after offers are made to landowners. When the offers are made in October or November, landowners will have 30 days for evaluation, after which eminent domain requests could be initiated with the Board of Directors. He estimated the maximum number of potential condemnations to be approximately 20 to 30. Mr. Grabauskas said that there was an ongoing, iterative process between the Right of Way and Design and Construction teams, in assessing when properties were needed. He complimented the Design and Construction team for designing the rail project to try and avoid real property takes.

V. Construction and Traffic Update

HART Director of Design and Construction Lorenzo Garrido, Information Specialist Scott Ishikawa, West Oahu/Farrington Highway Project Manager Karley Halsted, and Kiewit's Allison Gammel provided an update on construction and traffic. A copy of the presentation is attached hereto as Attachment B.

Mr. Garrido provided an update on the construction occurring at the Maintenance and Storage Facility (MSF). The Operations and Storage Building (OSB), Maintenance of

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Way Building (MOW), Wheel Truing Building (WTB), and Train Wash Facility are all in various stages of construction. The tilt-up walls of the OSB will be raised in late October. Utility work continues on the MOW Building, and foundation work is ongoing at the WTB. Site utility work is 80% complete, and the rail will begin to be laid on the guideway beginning February or March of 2015.

Ms. Halsted reported that the precast yard has 800 segments stockpiled, and approximately half a mile of segments has been assembled into the guideway. Utility and balanced cantilever work continues. Following up on a previous request, Ms. Halsted reported that the height of the balanced cantilever from the top of the roadway to the lowest point on the structure will be 28 ½ feet going eastbound, and 36 feet going westbound. Ms. Halsted detailed the progress on the underpass extending on the cane haul road adjacent to Waipahu High School.

She also reported on progress on the UH West Oahu station aesthetic columns. Mr. Horner asked if the columns are on the opposite side of the street from UH West Oahu. Ms. Halsted said that they are, and noted that the station location anticipates the fully built UH West Oahu campus. She said that aesthetic columns will be included in every station, and that there will be station access on both sides of the street.

Ms. Gammel provided an update on closures on Farrington Highway. Mr. Ishikawa said that HART will be keeping an eastbound lane open for the morning commute. He detailed how HART has minimized traffic impacts for the drill shaft work, which Ms. Gammel said is occurring near Waipahu High School. Ms. Gammel said that she will be providing more information the following month on future lane closures and outreach related to the balanced cantilever.

Ms. Halsted said that utility relocations and roadway widening are continuing in the Kamehameha Highway Guideway section, and that the test shaft program has wrapped up. Mr. Ishikawa reported on two overnight lane closures along Kamehameha Highway, as well as a lane closure near Pearlridge Shopping Center. There will also be a lane closure on Moanalua Freeway near McGrew Point.

Mr. Ishikawa said that at Aloha Stadium, HART is occupying an overflow parking lot of the stadium. HART has been working with the Stadium Authority on mitigation measures, which include an alternative parking location for stadium employees, and stadium shuttle buses for games from Kamehameha Drive-In and Leeward Community College.

Mr. Formby asked about communicating project progress to the public via photographs, which depict progress well. Mr. Grabauskas said that photos are posted on HART's website, distributed via the weekly e-blast, as well as shared with the media.

Mr. Horner suggested communicating that the MSF is under budget. He also suggested naming the MSF to convey the significance of the facility. He said that there had not been significant overruns on the MSF, and requested budget information for the facility.

Ms. Okinaga asked about the number of traffic-related complaints. Mr. Ishikawa said that traffic-related complaints have been minimal.

VI. Westside Stations Procurement

Mr. Lui-Kwan indicated that Russell Honma would be providing testimony. Mr. Honma testified in support of the cancellation of the Westside Stations procurement.

Mr. Grabauskas reported that HART staff had completed an extensive review of the bids received for Westside Stations group. It was determined that it was in the public's best interest to cancel the solicitation and put out a retooled bid package, as the lowest bid came in at approximately 60% over the engineers' estimate. He said that staff's evaluation revealed that the very active construction market and HART's compressed schedule to meet the 2017 interim opening contributed to the high bids. Mr. Grabauskas pointed out that despite the 13-month delay in construction and real estate acquisitions due to litigation, HART was still holding to its 2019 full revenue service opening date. However, the size of the Westside Stations contract, coupled with the schedule compression, required contractors to partner with larger subcontractors with the capability to perform work concurrently, thereby reducing the competitiveness of the bids.

Mr. Grabauskas said that in order to reduce costs, HART was considering breaking up the procurement into three packages of three stations and staggering notice to proceed dates. Although he said that staff was still in the evaluation process, it was likely that the interim opening would be pushed out to 2018, as he had been receiving feedback that staying within budget was more important than the interim opening. As an additional cost savings measure, HART was looking into value engineering station components that would not impact the ridership experience, such as utilizing a less costly broom finish for certain surfaces versus the more expensive exposed aggregate finish. Lastly, HART found that allowing contractors more flexibility in determining their means and methods would result in reduced costs.

Mr. Grabauskas said that staff had been reaching out to the original bidders and other contractors to confirm their findings, as well as researching other cost saving measures. He said that HART owed it to the public to minimize costs, not only for the Westside Stations package, but also the remaining 12 stations, the second 10 miles of guideway, and the Pearl Highlands Parking Garage.

Mr. Grabauskas said that he would report back to the Board on the lessons learned from the conversations with contractors. He said that the first three-station package would be out for bid in approximately 10 to 12 weeks. The three packages would be let six to eight weeks apart. The Airport Station Group package, also scheduled to be let later in the year, would be staggered in between the three Westside Stations packages.

Mr. Hong asked about the cost for each station package. Mr. Grabauskas said that staff was still completing its evaluation, and would have a new engineers' estimate once the

evaluation was complete. Mr. Hong remarked that as small contractors did not have the ability to obtain large bonds, they could form joint ventures in order to bid.

Ms. Okinaga asked if moving the interim opening would have any other impacts. Mr. Grabauskas responded that HART was holding to the 2019 full revenue service opening date, and that the rail cars would still be delivered in 2016. He said that there would perhaps be a few months' change in the schedule for the remaining stations and guideway.

Mr. Horner recalled that there may have been complexity in the tie-in between the rail and stations. Mr. Grabauskas said that some the Westside Stations package included atypical work for vertical construction companies, such as the H-1/H-2 ramp, environmental work near Waiawa Stream, and box girder construction. He said that staff was exploring the possibility of removing the ramp and environmental work from the bid package and procuring those specialty items separately, in an effort to drive down costs. He cited the recent under-budget bid package for seven drill shafts in the airport, which was let in order to avoid a possible conflict with the State Department of Transportation (HDOT)'s construction schedule for its future rental car facility.

Mr. Horner posited the possible advantage of putting all three-station packages out for bid at the same time, which could allow for a "quantity discount," if a contractor wanted to bid on all three. Mr. Grabauskas replied that staff was exploring that possibility in its interviews with contractors.

Mr. Horner asked for confirmation that the Airport Station was not included in the Westside Stations package, and Mr. Grabauskas confirmed it. He said that all four stations in the Airport Station section were currently planned be put out for bid at the end of the year. However, depending on what HART learned from the Westside Stations experience, the Airport section stations might be broken out into separate packages.

Mr. Hong asked whether it was possible to carve out some aspects of construction, such as having Kiewit perform some mass production construction work. Mr. Grabauskas replied that Kiewit was part of HART's industry survey.

Regarding Mr. Formby's inquiry about the timing of the decision on the interim opening, Mr. Grabauskas said HART would know in the next ten to twelve weeks. Mr. Formby noted that pushing the interim opening date back could have positive impacts on smart card development. Mr. Grabauskas agreed that doing so would allow more time for field testing the fare system, trains, and stations. Mr. Grabauskas likened the interim opening to a "soft opening," and said that HART was still retaining the full opening in 2019.

Ms. Okinaga asked what feedback HART had received from the Federal Transit Administration (FTA) about its strategy on the Westside Stations procurement. Mr. Grabauskas said that the FTA was supportive, as was the Project Management Oversight Consultant.

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Mr. Lui-Kwan thanked Mr. Grabauskas and HART staff for their efforts in maintaining budget, schedule, quality and safety.

Mr. Grabauskas acknowledged Deputy Executive Director Brennon Morioka, Mr. Garrido and Deputy Director of Design and Construction Dave Conover, Deputy Director of Projects John Moore, and Jay McRae of CH2Mhill for their work.

Mr. Hui commended Mr. Grabauskas and HART staff.

VII. Resolution 2014-2 – Relating to the Procurement of HART’s Fare Collection System

Mr. Grabauskas said that HART staff was requesting deferral of this item, to allow it additional time to refine the resolution. A copy of the draft resolution is attached hereto as Attachment C.

VIII. Owner-Controlled Insurance Program

Mr. Grabauskas thanked Mr. Bunda for lending his expertise in the insurance field to staff in the development of the insurance program.

Chief Financial Officer Diane Arakaki introduced HART’s Wes Mott, Marsh USA’s (Marsh) Kathy Dang, and Aon Risk Services Inc.’s (Aon) Chad Karasaki, who would be making the presentation, a copy of which is attached hereto as Attachment D. She stated that the objective in procuring an owner-controlled insurance program (OCIP) was cost effective insurance coverage for construction work for HART’s general contractors and subcontractors, including workers compensation, general liability, excess liability, and builder’s risk. Marsh will provide services for the administration and implementation of OCIP, while Aon will be the broker, and make adjustments to coverage and work directly with insurance carriers. Ms. Arakaki outlined the advantages of OCIP, which include the certainty of coverage and greater assurance limiting liability, reduction of costs due to economies of scale, and eliminating contractor overhead and markup. Ms. Arakaki detailed the layers of coverage, and said that OCIP allowed HART approximately \$38 million in cost avoidance over the contractors’ insurance estimates.

Ms. Okinaga asked about the time frame for the contractors’ cost estimate, and Ms. Arakaki replied that the cost referred to amounts paid to date, and estimated through the end of the project.

Mr. Bunda said that the real savings would come in controlling losses. Ms. Dang explained that the \$18.5 million estimated deductible represented estimated losses based on other rail projects; any losses up to that amount presented a potential for savings in controlling losses. The workers compensation and general liability programs have \$500,000 deductibles per occurrence, which also include caps. She said that as Marsh oversees safety and risk controls, they were impressed with the management and oversight of the rail project. Mr. Grabauskas agreed that both HART and Kiewit had a great safety record of .4 incidents per 100,000 hours of work.

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Mr. Bunda asked if all contractors must participate in the OCIP program, and Ms. Arakaki confirmed that they must. Mr. Bunda asked how many participants there were. Ms. Dang replied that there were about 70 participants, but that number would increase to possibly several hundred. Noncompliance could result in fines or dismissal.

Ms. Arakaki said that OCIP premiums were based on estimated payroll and hard construction values. These values would be audited and premiums adjusted up or down accordingly, so that the total cost of insurance would not be known until the end of the project. She said that the maximum deductible cap would be \$25.5 million.

Mr. Horner asked what the FFGA budget was for insurance, and Ms. Arakaki replied that it was \$65 million. Mr. Horner expressed his approval that OCIP was coming in under budget. Mr. Bunda reiterated that the potential for savings is great due to HART's strong safety program.

Mr. Horner asked how HART's insurance program compared to the City and County of Honolulu, and asked if the City was self insured. Mr. Mott replied that the coverage being purchased by HART is only for HART. Ms. Okinaga said that the City was self insured up to a certain amount for its construction projects. Mr. Karasaki explained that the City insures itself for each project through its contractors. Mr. Horner asked if HART was acquiring more coverage than the average City project. Ms. Okinaga said that the City is an additional insured under HART's coverage.

Ms. Arakaki outlined the next steps in rolling out the insurance program, and said that staff would report semiannually to Board, including insurance loss control tracking. Mr. Bunda asked what the report would contain. Ms. Dang said that it would report on costs to date, losses, and expected payrolls.

Mr. Hui asked whether contractors who win future bids would be required to participate in OCIP. He also asked about contractors with existing contracts. Mr. Mott said that current contracts contain language anticipating OCIP, and future contracts would contain similar language. Mr. Grabauskas confirmed that current contractors had been informed that they were now covered by OCIP.

Mr. Formby asked whether the excess liability carriers' exposure was proportional and Mr. Karasaki confirmed that it was.

Mr. Bunda complimented the insurance team on its great work.

IX. Project Risks Review

Mr. Grabauskas said that the project risks review update was part of HART's periodic updates to the Board of the items on its risk register. He recognized the positive aspects of recognizing risks, in allowing HART to avoid or mitigate risks. He said HART staff and the FTA meet regularly to discuss risks.

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Mr. Grabauskas said that in April, the FTA and HART had conducted a detailed “risk refresh” review of the project. The FTA had subsequently issued its report on that review, to which HART responded. A copy of the report and response are attached hereto as Attachment E.

Mr. Grabauskas summarized by saying that the project was on schedule and on budget, and that despite the many risks faced by the project, it had weathered those risks well to date. The FTA’s first area of focus was the technical capacity of the project, which they reviewed as excellent. Schedule was their second area of focus: although the opening date contained in the FFGA is January 1, 2020, HART had planned a 300-day cushion for its opening of spring 2019. Regarding budget, the project remains in a good position despite the delay costs.

Mr. Grabauskas said that the FTA also asked HART to look at two mitigation categories: cost reduction without impact to the overall program (i.e., OCIP, value engineering), and secondary mitigation (additional measures in a worst-case risk scenario).

He thanked Director of Planning and Right of Way Elizabeth Scanlon, Project Controls Manager David Sagherian, and Fiscal Analyst Corey Ellis for their work on the risk refresh.

Mr. Lui-Kwan asked about the project contingency, which was \$563.7 million as of July, and comprised of \$163.8 million in allocated contingency, \$8.3 million of committed contingency, and \$392 million in uncommitted contingency. Mr. Grabauskas said that \$643 million was the contingency balance at the time of the FFGA, and \$563.7 million was remaining as of July. \$390 million is the amount that will be left if every identifiable risk occurs. Mr. Lui-Kwan noted that the PMOC report did not track exactly with the risk report, and Mr. Grabauskas attributed that difference to the lag time between the actual drawdown and the reporting period.

Mr. Horner noted that HART’s cash balance was ahead of projections. He opined that the construction of the Pearl Highlands parking structure could be pushed back if necessary. Mr. Grabauskas said that decision would depend on the interviews with contractors and bids. He said that staff is evaluating whether it should wait until the bids are received to make that decision.

Mr. Hui requested future updates on the relationship between the schedule and the delays that have occurred. Mr. Grabauskas noted that he would discuss that in his Executive Director’s report.

Ms. Okinaga asked whether the financial plan referred to previously was the revised financial plan, as opposed to the FFGA financial plan. Mr. Grabauskas confirmed that it was. She asked to confirm that the revised staffing plan would be available by the end of the year, and Mr. Grabauskas said it would.

X. Executive Director and CEO's Report

Mr. Grabauskas reported that changes to the guideway configuration had necessitated further trenching required by the State Historic Preservation Division (SHPD). He said that the report on that additional trenching had been approved by SHPD. An additional 14 trenches will be dug the upcoming week near Ala Moana.

Mr. Grabauskas introduced HART's Whitney Birch, who will be working with HART on the fare collection system.

Ms. Birch gave a brief background, including her work on Vancouver's fare system design, and work on the Sky Train. In the U.S., she worked on the first smart card systems in New York and New Jersey, as well as in Miami-Dade and Houston.

Mr. Grabauskas continued by reporting on the City Council Finance Committee's recent meeting, at which impacts to the contingency fund were discussed. He thanked Mr. Lui-Kwan and Mr. Hui for attending. Mr. Grabauskas reported that the next day, he would be attending a community planning meeting sponsored Senator Suzanne Chun-Oakland. Mr. Grabauskas had recently spoken to the American Institute of Architects and the Honolulu Board of Realtors.

Mr. Grabauskas provided an update on the Core Systems contract, making a presentation on vehicle profile samples, a copy of which is attached hereto as Attachment F. He passed around aluminum pieces of the rail car chassis that were produced in Ansaldo's factory in Italy. The chassis parts will be shipped to Ansaldo's main factory and assembled. The car shells will then be shipped to Pittsburgh, California beginning in early 2015, where the final assembly will take place.

Mr. Formby asked if the pieces were molded. Mr. Grabauskas replied that they were extruded.

Ms. Okinaga asked if HART was monitoring the manufacturing process. Mr. Grabauskas said that HART's Rainer Hombach and consultants would soon be visiting the Ansaldo factory as part of HART's ongoing oversight. He thanked Ansaldo for their work.

Mr. Horner expressed his approval of the use of aluminum, which would not rust.

Mr. Hui asked whether HART was comfortable with its working relationship with Ansaldo. Mr. Grabauskas confirmed that it was, and that Ansaldo was on schedule.

Mr. Horner pointed out that Ansaldo had reassured HART that they would deliver on the contract, whether or not a merger occurred. Mr. Grabauskas confirmed that Ansaldo's parent company Finmeccanica had given its assurances to HART that it would deliver.

Mr. Hong asked about inspection and monitoring. Mr. Grabauskas said that HART staff and contractors had been providing ongoing design monitoring, as well as construction and schedule monitoring.

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XI. Executive Session

There was no need for executive session.

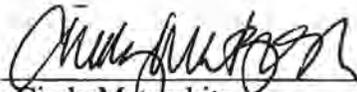
XII. Executive Director & CEO's Contract

Mr. Lui-Kwan invited Ms. Okinaga to report on the Executive Director and CEO's contract. Ms. Okinaga said that the Human Resources Committee had met twice and provided an opportunity for the public to comment on the contract. She said that the committee was continuing to meet.

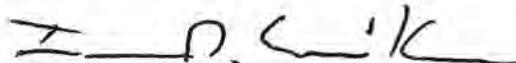
XIII. Adjournment

With no further business before the Board, Mr. Lui-Kwan adjourned the meeting at 10:56 a.m.

Respectfully Submitted,


Cindy Matsushita
Board Administrator

Approved:


Ivan Lui-Kwan, Esq.
Board Chair

OCT 9 2014

Date

ATTACHMENT A

HART

HONOLULU AUTHORITY for RAPID TRANSPORTATION

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HART Board Right-of-Way Status Update

September 11, 2014

**Elizabeth Scanlon
Director of Planning & Right-of-Way**

**Morris Atta
Deputy Director of Right-of-Way**

Paragon Consultant Update

- Full complement of Professional Staff on board-all Acquisition Agents and Contractors were hired locally.
- Clerical position to be hired locally.
- Expenditures for Labor and Other Direct Costs incurred within budgeted amount.

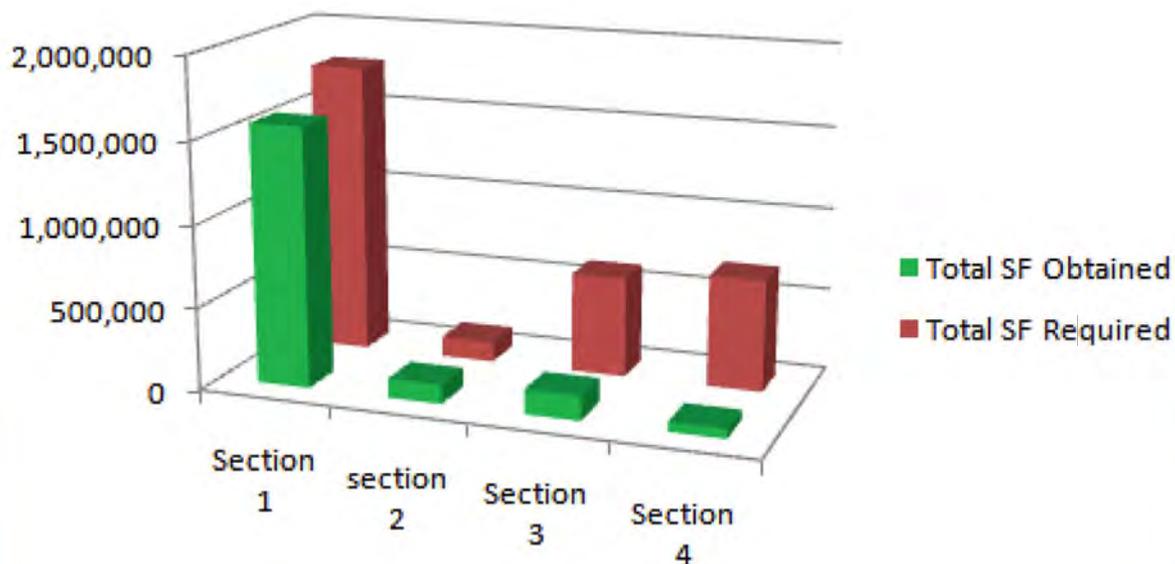
Progress Acquisition by Area

Project Total
as of 8/31/2014



Permanent ROW (SF)	Total Land Requirement for Project (Entire Alignment)	2,682,871
	Total Available for Contractor	1,905,037
	Total Land Remaining to be Acquired	777,834
	% Complete	71%

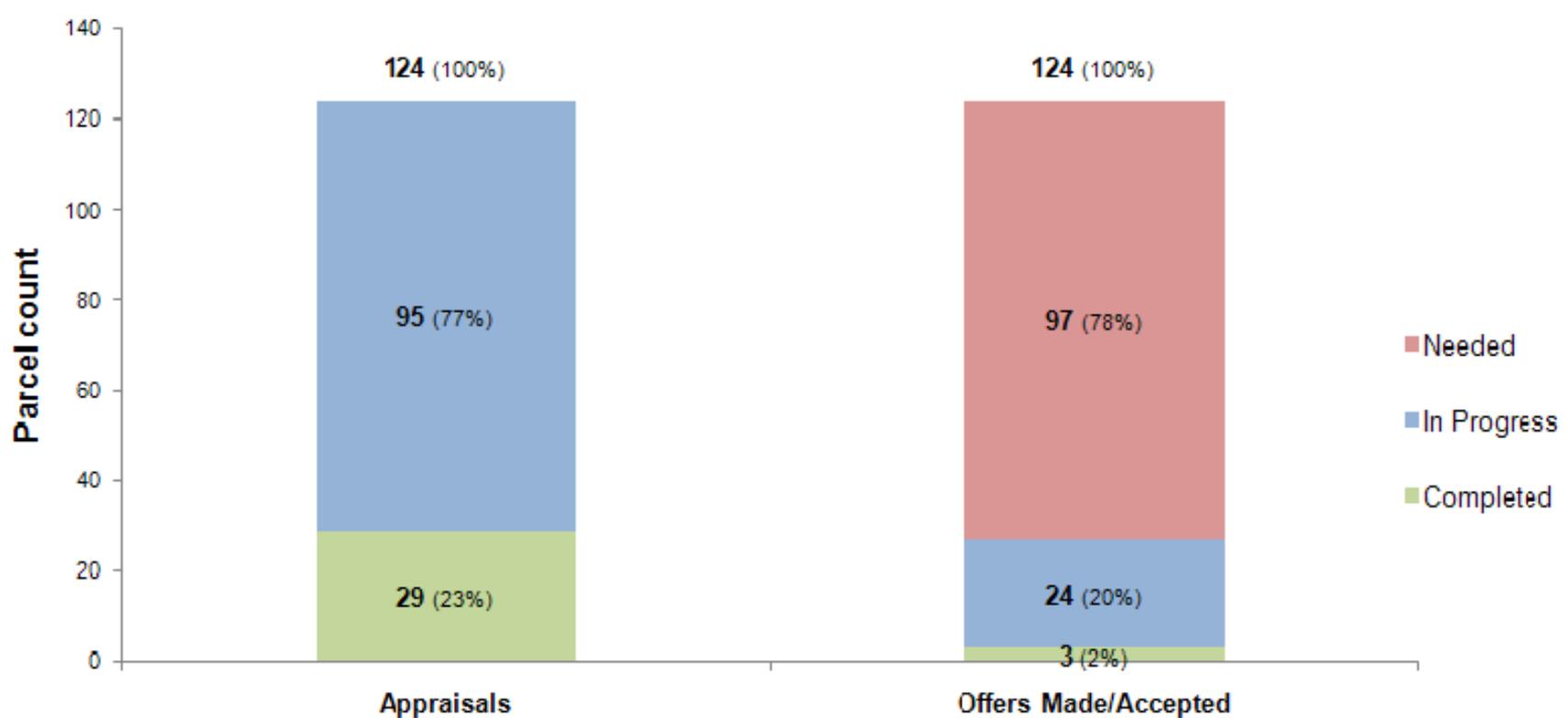
By Section as of 8/31/2014



	Section 1	Section 2	Section 3	Section 4
Total SF Obtained	1,578,404	117,271	150,861	58,715
Total SF Required	1,778,460	122,187	611,093	680,776
% Progress	89%	96%	25%	9%

Appraisal and Offer Status

Privately Owned Parcels to be acquired as of 8/27/2014



*38 of the 162 needed parcels are government owned and excluded from the figures above since only negotiated agreements are necessary for acquisition.

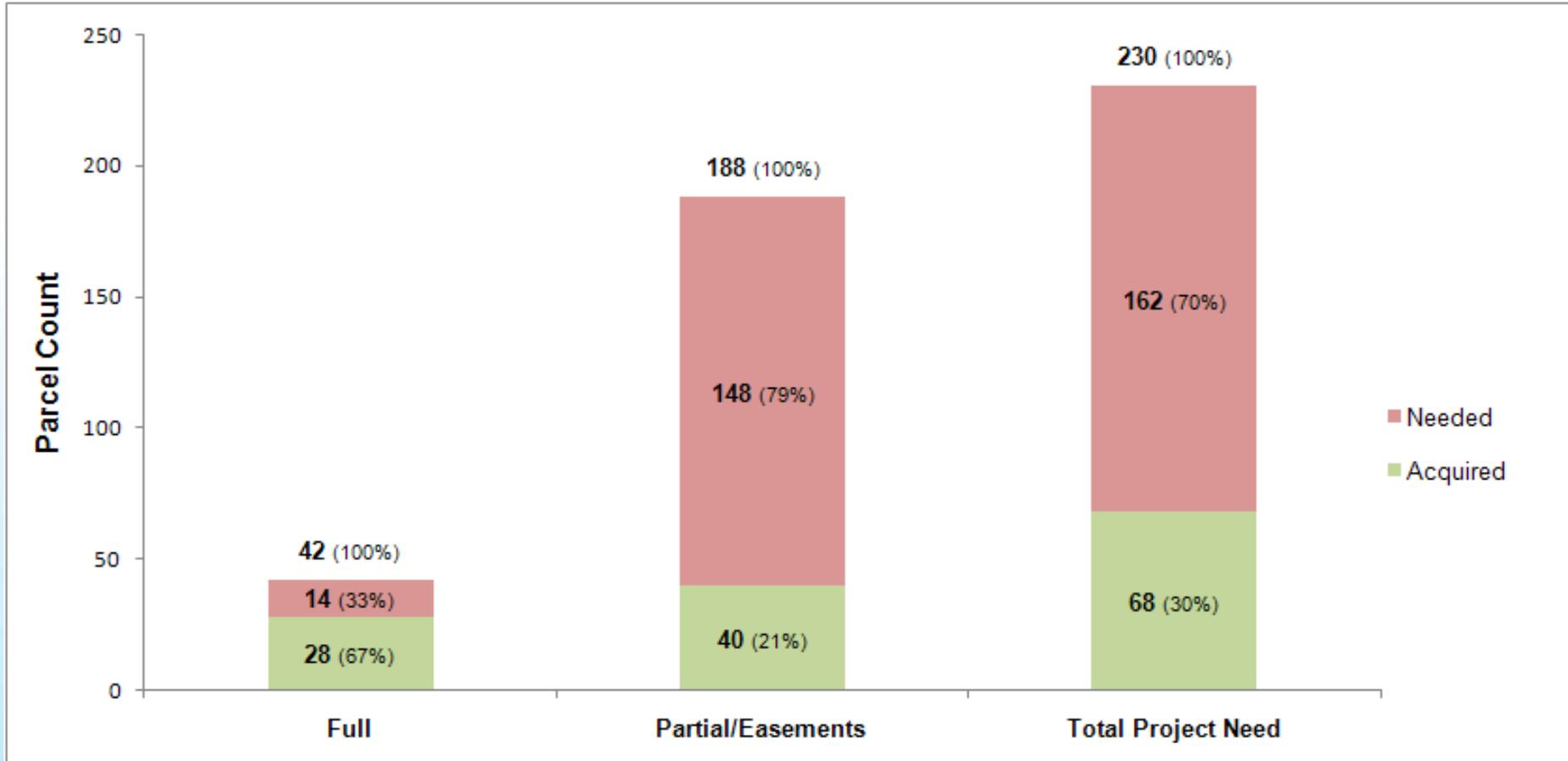
Acquisition Status by Section

as of 8/27/2014

	ACQUIRED		TOTAL PROJECT NEED
WOFH	23	66%	35
KHG	6	55%	11
Airport	29	55%	53
City Center	10	8%	131
TOTAL	68	30%	230

Acquisition Status by Take

as of 8/27/2014



Current Updates

as of 9/10/2014

Offers Accepted since August 4 2014

- 94-144 Farrington Hwy
Partial Take
Relocation in Process
- 1927 Dillingham Blvd
Full Take
Relocation in Process
- 1174 Waimanu St
Full Take
Relocation in Process

Acquisition Summary as of 8/27/2014

Summary:

28 Acquisitions

40 Agreements/Easements/ROE

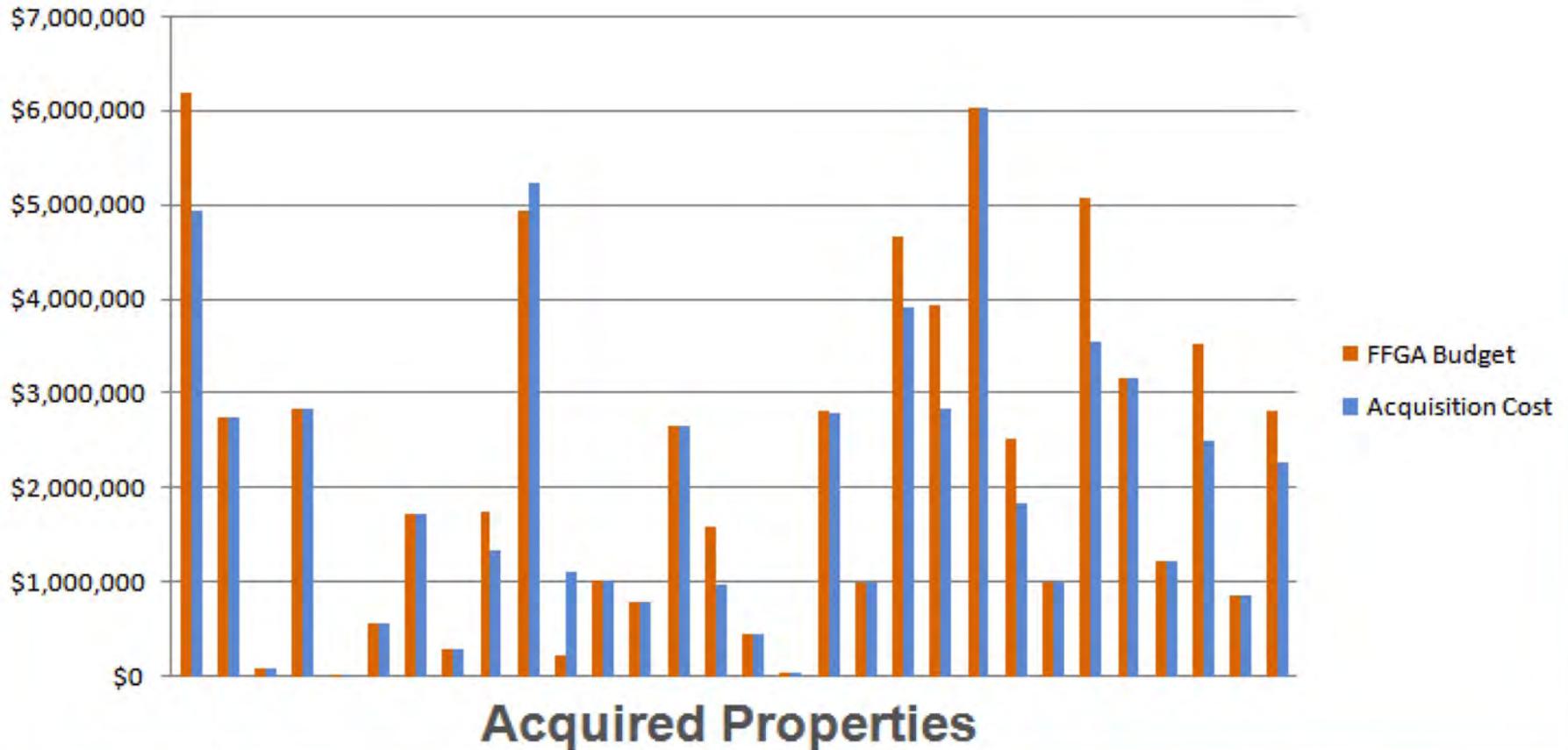
68 TOTAL CLOSED TRANSACTIONS

No	TMK	Take	Address	Total Acquisition (\$)	FFGA Budget	Note	Remaining Balance in Budget
1	1-1-016-005	Full	2676 Waiwai Lp	4,924,144	6,173,973		1,249,829
2	1-1-016-006	Full	2668 Waiwai Lp	3,918,089	4,648,445		730,358
3	1-1-016-014	Full	479 Lagoon Dr	2,843,274	3,930,328		1,087,055
4	1-1-016-015	Full	515 Lagoon Dr	3,551,508	5,067,859		1,516,151
5	1-2-003-016	Full	1819 Dillingham Blvd	1,106,416	222,516		-883,900
6	1-2-003-082	Full	1825 Dillingham Blvd	984,299	1,596,625		612,326
7	1-2-009-001	Full	1901 Dillingham Blvd	2,805,135	2,814,000		8,865
8	1-2-010-068	Full	1900 Dillingham Blvd	1,831,279	2,529,000		697,721
9	1-5-007-023	Full	533 Kaaahi St	2,850,000	2,850,000	*	0
10	1-7-002-026	Full	902 Kekaulike St	5,219,351	4,927,000		-292,351
11	2-3-004-048	Full	1156 Waimanu St	1,730,578	1,730,578	*	0
12	2-3-004-069	Full	1188 Waimanu St	2,660,398	2,658,317		-2,081
13	9-4-017-011	Full	94-818 Moloalo St	870,000	870,000	*	0
14	9-4-019-050	Full	94-819 Farrington Hwy	1,004,277	1,005,000		723
15	9-4-048-046	Full	94-119 Farrington Hwy	3,159,142	3,159,142	*	0
16	9-4-048-047	Full	94-136 Leonui St	2,749,142	2,749,142	*	0
17	9-6-003-012	Full	96-171 Kamehameha Hwy	287,030	287,030	*	0
18	9-6-003-013	Full	96-165/169 Kamehameha Hwy	455,588	455,588	*	0
19	9-6-003-014	Full	96-157 Kamehameha Hwy	1,216,787	1,216,787	*	0
20	9-6-003-015	Full	96-159 Kamehameha Hwy	53,304	53,304	*	0
21	9-6-003-016	Full	96-149A Kamehameha Hwy	22,304	22,304	*	0
22	9-6-003-017	Full	96-149 Kamehameha Hwy	559,914	559,914	*	0
23	9-6-003-018	Full	96-137 Kamehameha Hwy	1,017,915	1,017,915	*	0
24	9-6-004-002	Full	96-93 Kamehameha Hwy	790,000	790,000	*	0
25	9-6-004-017	Full	Kamehameha Hwy	90,000	90,000	*	0
26	9-8-009-017	Full	98-077 Kamehameha Hwy	2,509,030	3,512,500		1,003,470
27	9-8-010-002	Full	98-080 Kamehameha Hwy	6,027,021	6,027,021	*	0
28	9-9-003-068	Full	99-140 Kohomua St	993,783	993,783	*	0
				56,229,706	61,957,872		5,728,166

Notes:

* Baseline assumes zero variance (budget = actual) during FFGA approval process.

Acquisition Cost as of 8/27/2014



Mahalo!



ATTACHMENT B

HART

HONOLULU AUTHORITY for RAPID TRANSPORTATION

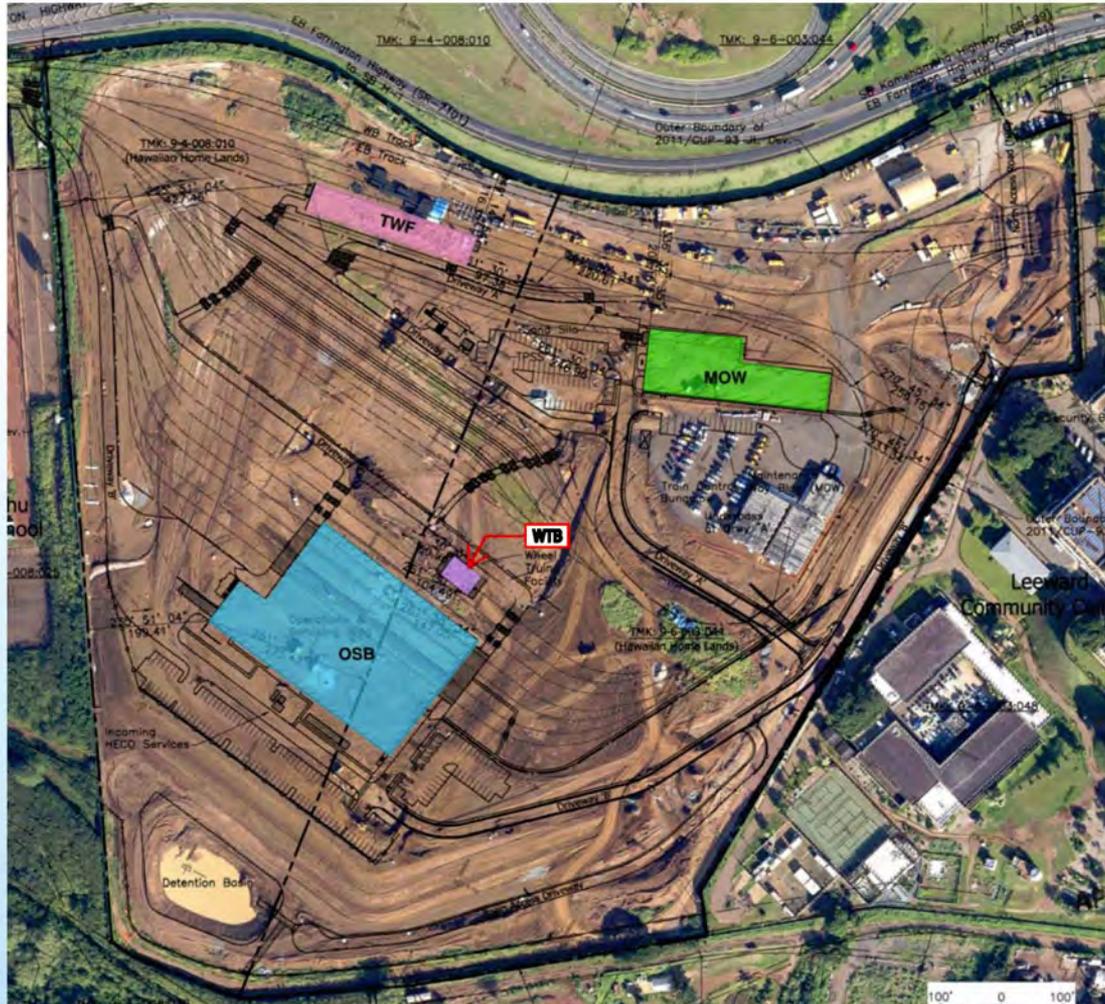
Construction and Traffic Update September 11, 2014

H O N O L U L U R A I L T R A N S I T P R O J E C T

WWW.HONOLULUTRANSIT.ORG

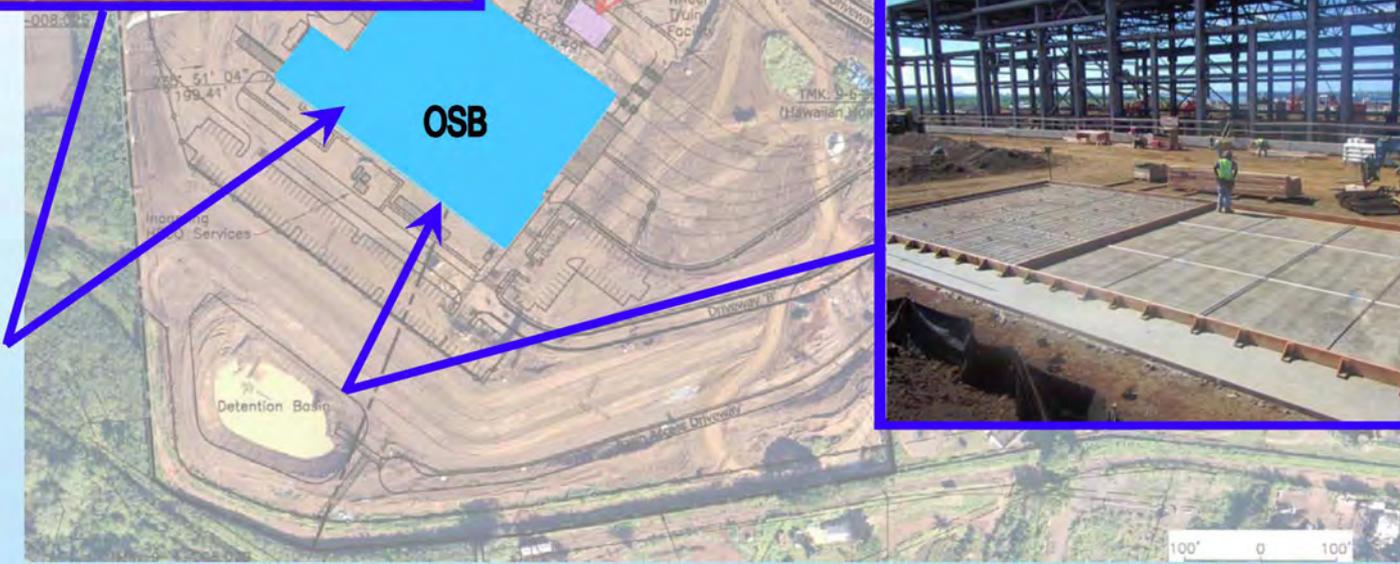
HART
HONOLULU AUTHORITY for RAPID TRANSPORTATION

Maintenance & Storage Facility



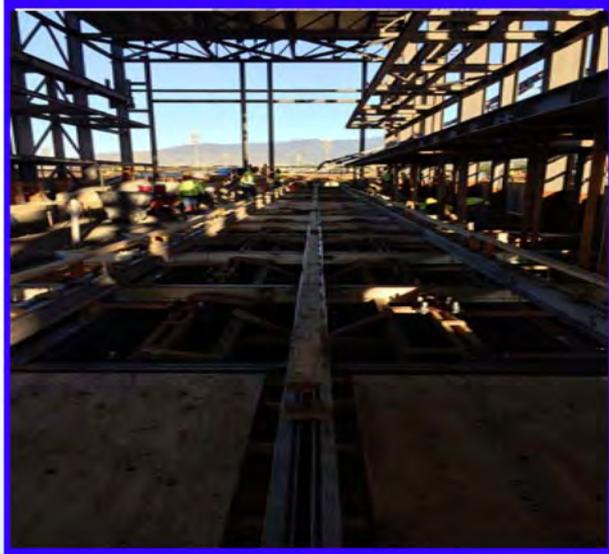
Maintenance & Storage Facility

Operations & Servicing Bldg. Construction



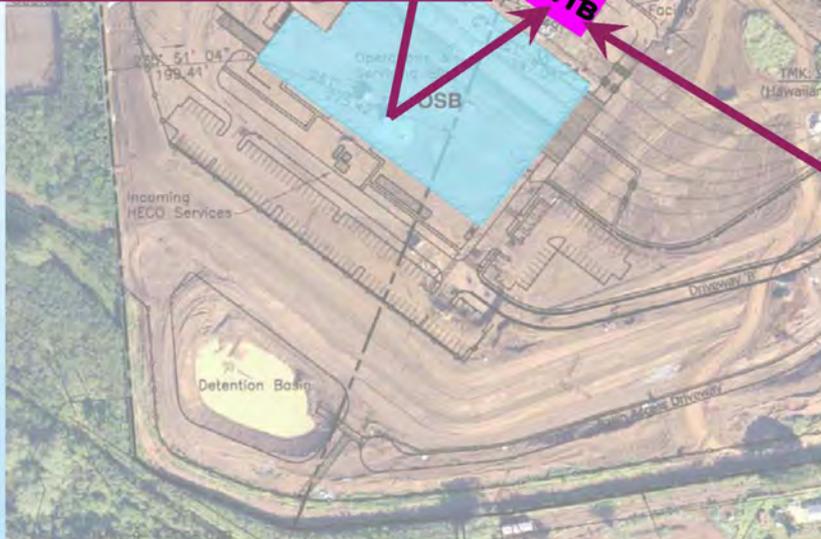
Maintenance & Storage Facility

Operations & Servicing Bldg. Construction



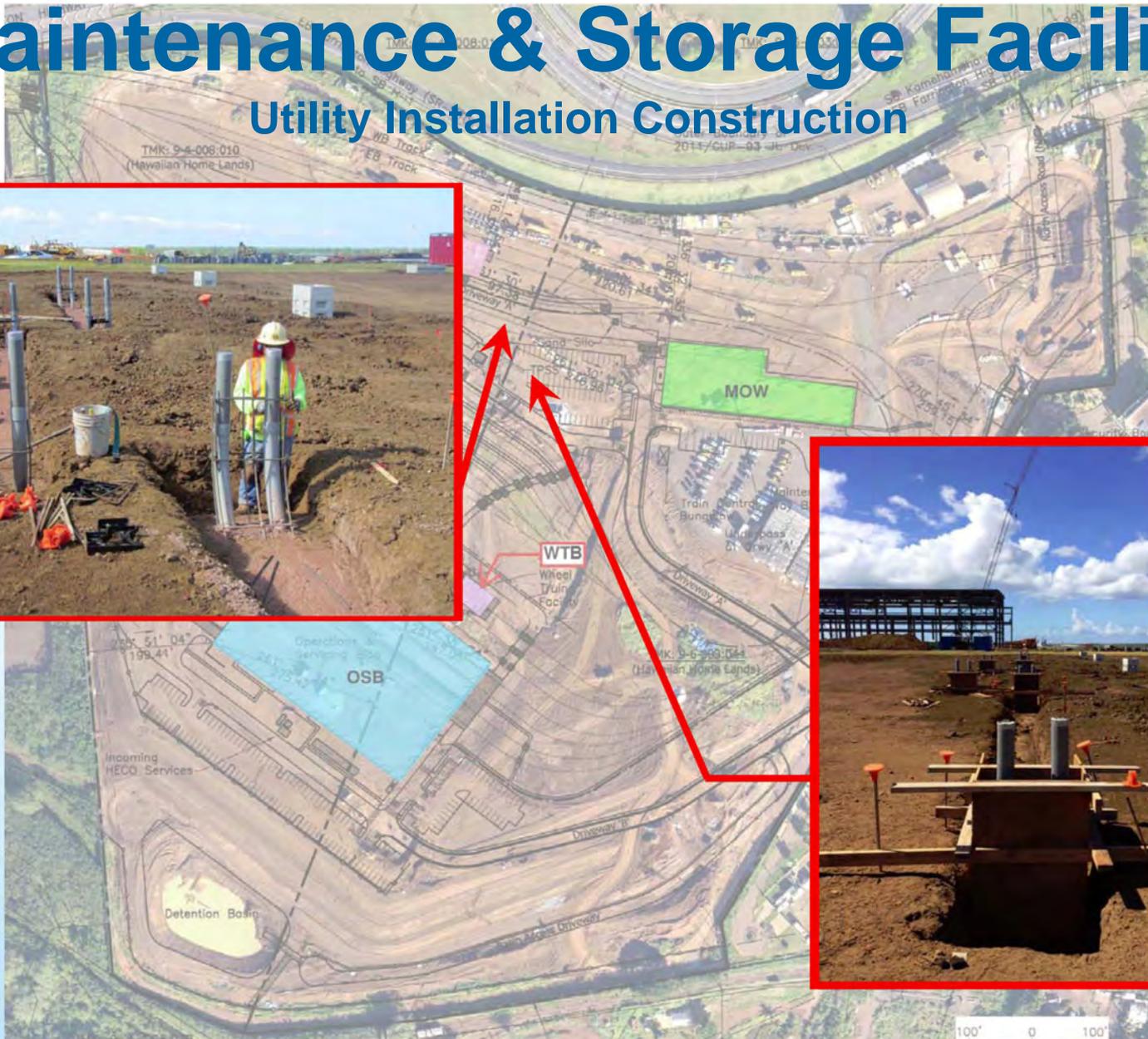
Maintenance & Storage Facility

Wheel Truing Building Construction



Maintenance & Storage Facility

Utility Installation Construction



Guideway



Precast Yard & Segments



Utilities, Balanced Cantilever & Underpass



Columns and Shafts



Traffic Update

Location: Farrington Highway in Ewa between Kualakai Parkway and Old Fort Weaver Road
Work: Overnight utility work



Traffic Update

Location: Farrington Highway at Fort Weaver/Kunia Road overpass

Work: Installation of shaft and column at Fort Weaver Road overpass



Traffic Update

Location: Farrington Highway at Fort Weaver/Kunia Road overpass

Work: Installation of shafts and columns



Traffic Update

Location: Farrington Highway near Waipahu High School

Work: Preparation for drill shaft work



Traffic Update

Location: H-1/H-2 Freeway merge (Waiawa Interchange)

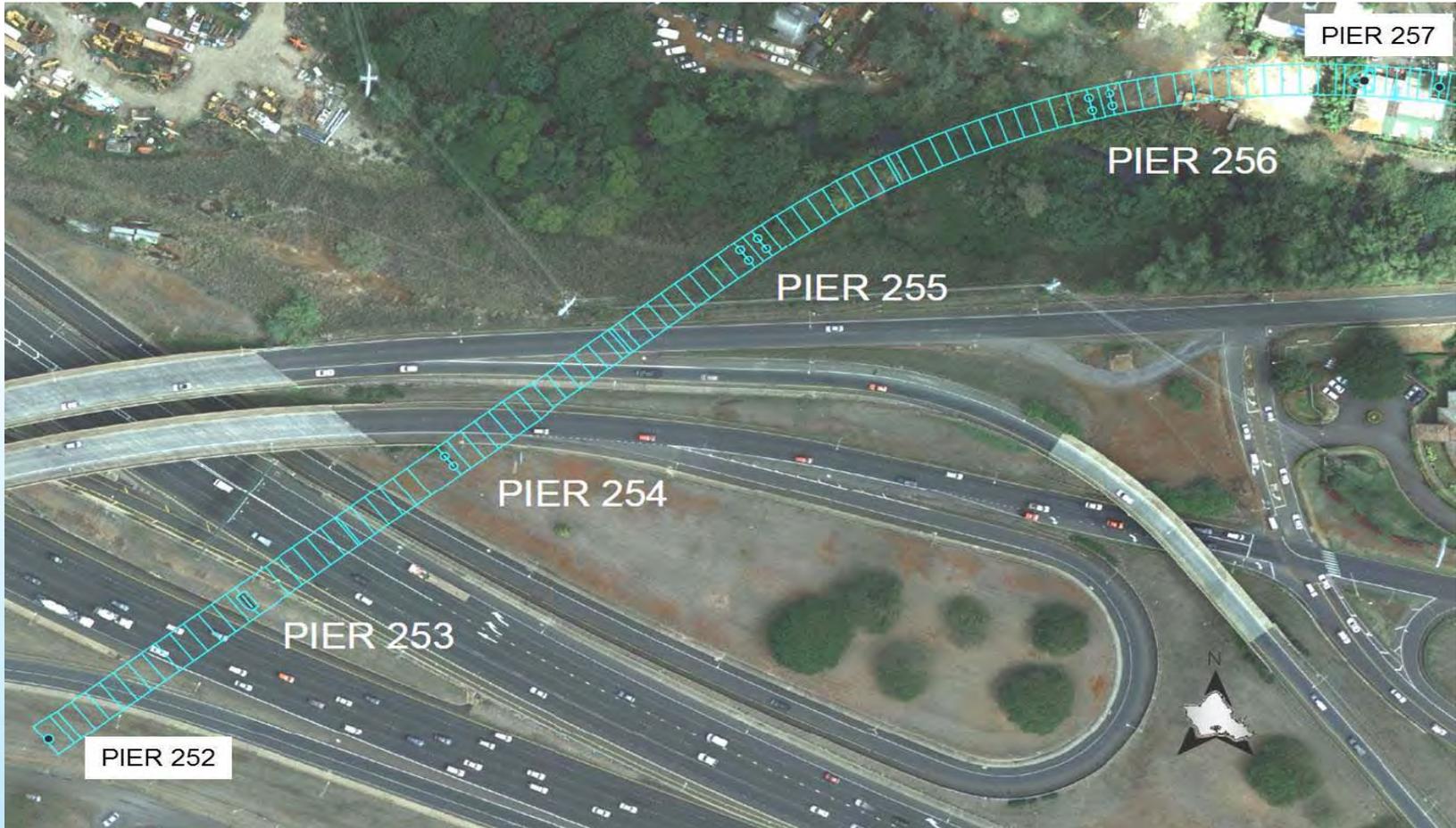
Work: Guideway work for balanced cantilever work later this fall



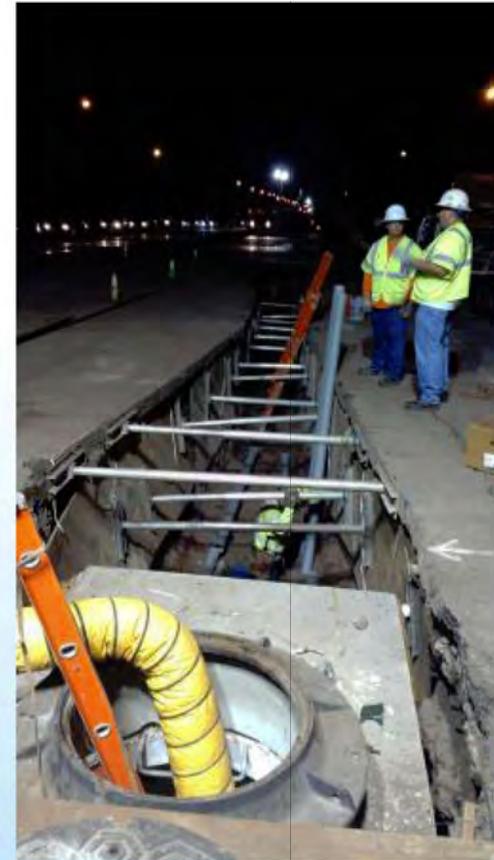
Traffic Update

Location: H-1/H-2 Freeway merge (Waiawa Interchange)

Work: Guideway work for balanced cantilever work later this fall



Kamehameha Highway Guideway

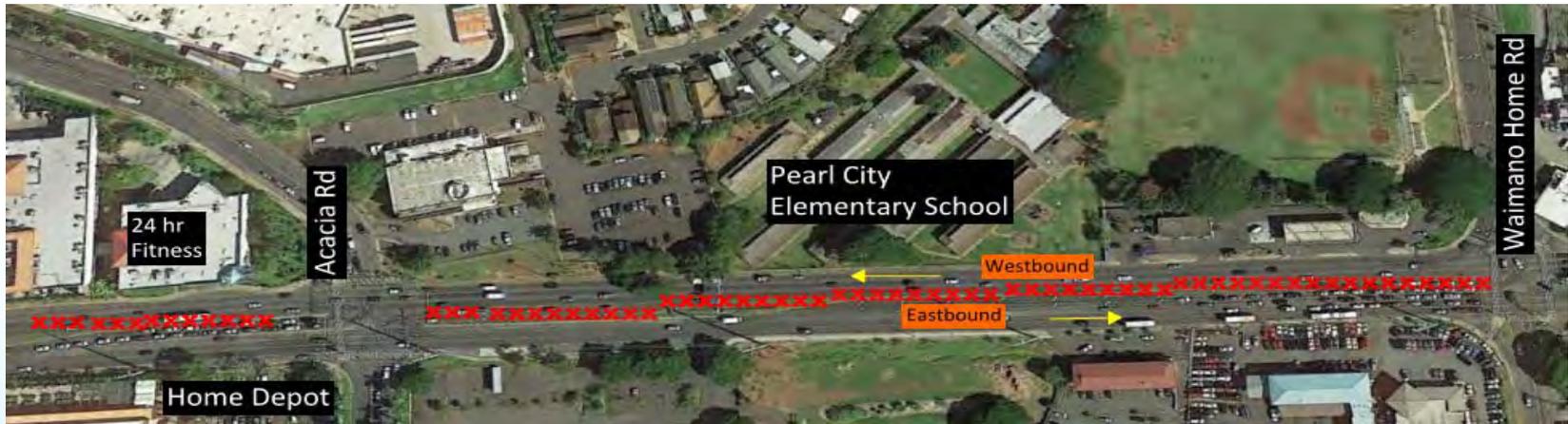


Roadway Widening & Utility Relocations

Traffic Update

Location: Kamehameha Highway between Acacia Road and Kuleana Road

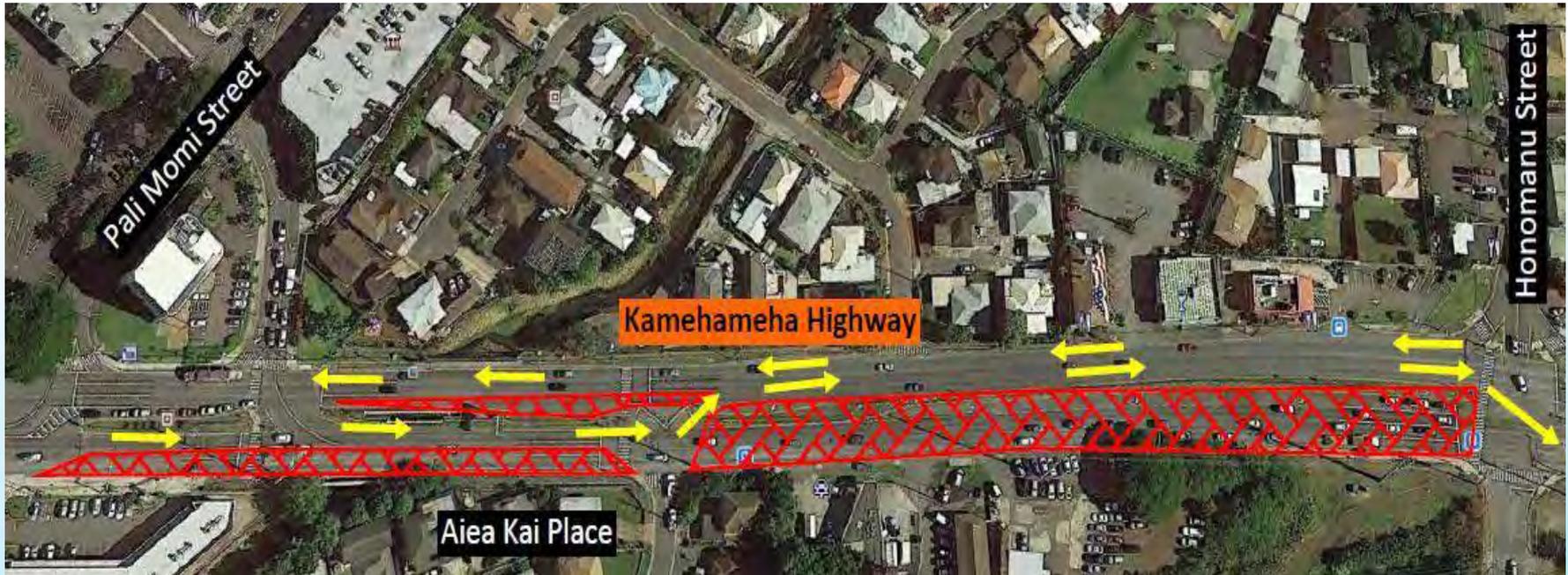
Work: Utility relocation work



Traffic Update

Location: Kamehameha Highway in Aiea between Pali Momi and Honomanu Streets

Work: Utility relocation work



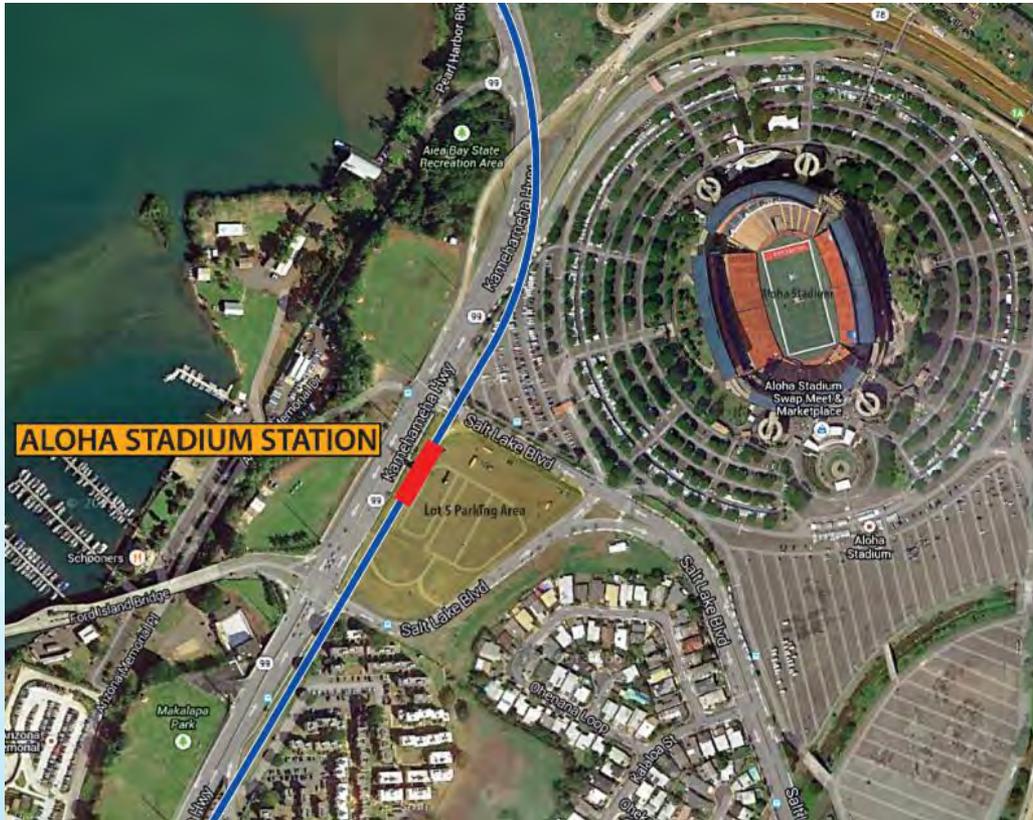
Traffic Update

Location: Moanalua Freeway on-ramp near McGrew Point

Work: Utility relocation work



Rail Construction Near Aloha Stadium



- Replacement parking for stadium employees at Aiea Elementary
- Additional shuttle buses to and from satellite parking lots

Mahalo!



Honolulu Authority for Rapid Transportation

RESOLUTION NO. 2014-2

**RELATING TO THE FARE COLLECTION SYSTEM FOR THE HONOLULU AUTHORITY
FOR RAPID TRANSPORTATION**

WHEREAS, the Honolulu Authority for Rapid Transportation (HART) has been established pursuant to Article XVII of the Revised Charter of the City and County of Honolulu 1973, as amended to plan, construct, operate, maintain and expand the City's fixed guideway mass transit system;

WHEREAS, the HART Board of Directors in August 2012 endorsed staff's efforts to pursue due diligence for a closed/gated fare collection system, given staff's preliminary finding that capital costs associated with fare gates were outweighed by the added staffing costs and lost fare revenue of an open, gateless system.

WHEREAS, HART, in partnership with the City and County of Honolulu Department of Transportation Services (DTS) and Oahu Transit Services (OTS), is embarking on a program to develop a fare payment system that will allow for seamless intermodal connectivity between rail, bus and paratransit services;

WHEREAS, related to these efforts, DTS has commissioned a fare collection study to recommend and procure a fare collection system that could serve OTS' bus and paratransit operations and HART's rail project in a closed/gated system;

WHEREAS, in conjunction with the DTS fare collection study HART staff, DTS and OTS have been working collaboratively towards the common goal of a mutually-beneficial fare collection system that will serve various forms of public transit;

WHEREAS, the electronic fare collection system contemplated by the study utilizes smart cards in its initial formulation;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of HART that the Board supports the acquisition by HART of an electronic fare collection system that is capable of utilizing smart cards, is compatible with a closed/gated transit system and can be integrated with the City's public transit fare collection system.

ADOPTED by the Board of the Honolulu Authority for Rapid Transportation on

_____.

Board Chair

ATTEST:

Board Administrator

Honolulu Authority for Rapid Transportation

STAFF SUMMARY

TITLE: RELATING TO THE FARE COLLECTION SYSTEM FOR THE HONOLULU AUTHORITY FOR RAPID TRANSPORTATION	STAFF CONTACT: Cindy Matsushita	DATE: September 11, 2014
---	---	------------------------------------

Type:	Goal	Focus Area	Reference Notes
<input checked="" type="checkbox"/> Action/Approval	<input checked="" type="checkbox"/> Project Delivery	<input type="checkbox"/> Livability/Land Use	
<input type="checkbox"/> Information	<input type="checkbox"/> Service Delivery	<input type="checkbox"/> Partnerships	
<input type="checkbox"/> Follow-up	<input type="checkbox"/> Resource Stewardship	<input type="checkbox"/> Agency Admin.	

1. Purpose:
To authorize the acquisition of fare collection system hardware that integrates with the public transit system of the City and County of Honolulu

2. Background/Justification
HART staff, the Department of Transportation Services and Oahu Transit Services have been working to develop a mutually-beneficial fare collection system that will serve various forms of public transit that will allow for seamless intermodal connectivity between rail, bus and paratransit services

3. Procurement Background
The HART Board of Directors has previously endorsed staff's efforts to pursue due diligence for a closed/gated fare collection system, given staff's preliminary finding that capital costs associated with fare gates were outweighed by the added staffing costs and lost fare revenue of an open, gateless system

4. Financial/Budget Impact
To be determined

5. Policy Impact
Supports the acquisition of an electronic fare collection system that is capable of utilizing smart cards, is compatible with a closed/gated transit system and can be integrated with the City's public transit fare collection system

6. Public Involvement
N/A

7. Alternatives
N/A

8. Exhibits
N/A

Certified and Recommended by:



Executive Director and CEO

9/9/14

 Date

ATTACHMENT C

ATTACHMENT D

HART Owner Controlled Insurance Program (OCIP)



Overview

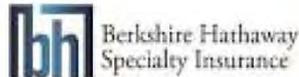
- Key OCIP objectives
- Scope of coverage

Advantages of an OCIP

- Certainty of coverage and greater assurance limiting liability
- Reduced costs due to economies of scale
- Reduced costs by eliminating contractor overhead and mark-up
- Reduced cost of potential claim settlements
- Protection against post-completion claims
- Better coordination of safety efforts



HONOLULU AUTHORITY FOR RAPID TRANSPORTATION (HART) INSURANCE PROGRAM



5th Layer – Excess Liability \$40M p/o \$100M xs \$100M Syndicates at Lloyds AM Best Rating: A XV	5th Layer – Excess Liability \$25M p/o \$100M xs \$100M Swiss Re International AM Best Rating: A+ XV	5th Layer – Excess Liability \$35M p/o \$100M xs \$100M Ironshore Specialty Ins. AM Best Rating: A XIV	\$200 Mil
4th Layer – Excess Liability \$25,000,000 xs \$75,000,000 National Fire & Marine Insurance (Berkshire) AM Best Rating: A++ XV			\$100 Mil
3rd Layer – Excess Liability \$25,000,000 xs \$50,000,000 Starr Indemnity & Liability Company AM Best Rating: A XIV			\$75 Mil
2nd Layer – Excess Liability \$25,000,000 xs \$25,000,000 Endurance American Insurance Company AM Best Rating: A XV			\$50 Mil
1st Layer – Lead Excess Liability \$25,000,000 Allied World National Assurance Company AM Best Rating: A XV			\$25 Mil
General Liability \$2M/ \$2M/\$4M \$500,000 Deductible Old Republic General Insurance Corp. AM Best Rating: A IX	Workers Compensation \$1M/\$1M/\$1M \$500,000 Deductible Old Republic General Insurance Corp. AM Best Rating: A IX		Primary

Cost Avoidance

- Provided by Contractor: Estimated \$99M
- Provided through OCIP: \$61M

Estimated OCIP Cost

Workers Compensation \$3.7M

General Liability 7.7M

Excess Liability 7.7M

Builders Risk 5.0M

Claims Administration 2.7M

Estimated Deductible 18.5M

SUB-TOTAL \$45.3M

Coverage to-date \$16.0M

TOTAL \$61.3M

Next Steps

- Workers Compensation, General Liability and Excess Liability Roll-Out: September
- Builder's Risk Roll-Out: September
- Enrollment: September
- Semi-annual Report to Board Including Insurance Loss Control Tracking

Mahalo!



ATTACHMENT E



U.S. Department
of Transportation
**Federal Transit
Administration**

REGION IX
Arizona, California,
Hawaii, Nevada, Guam
American Samoa,
Northern Mariana Islands

201 Mission Street
Suite 1650
San Francisco, CA 94105-1839
415-744-3133
415-744-2726 (fax)

AUG 14 2014

Daniel Grabauskas
Executive Director & CEO
Honolulu Authority for Rapid Transportation
1099 Alakea Street, 17th Floor
Honolulu, HI 96813

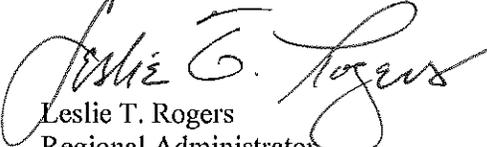
Dear Mr. Grabauskas,

Enclosed is the Federal Transit Administration's (FTA) 2014 Risk Refresh Report on the Honolulu Authority for Rapid Transportation's (HART) Honolulu Rail Transit Project (Project). As explained to HART staff in our recent meeting of July 30, 2014, FTA's risk assessment process is designed to evaluate the reliability of the project scope, cost estimate, and schedule with special focus on the elements of uncertainty associated with the effectiveness and efficiency of the project's implementation and within the context of the surrounding project conditions. While at this time the Project remains on schedule and budget, the Report notes HART's proactive management practices particularly since the resumption of construction and addresses the challenges and increasing pressure on the schedule and budget. These include, but are not limited to, past construction delays that have had significant cost impacts on the active design-build contracts with escalation still to be determined and recent cost estimates on future construction packages for eastern segments of the Project. The Report also addresses market concerns regarding the cost of labor amid other concurrent construction projects in the Honolulu market place.

FTA appreciates the time and co-operation extended by HART staff to our project management oversight contractor (PMOC) to assist in the development of the Report. The PMOC, in its independent development of the Report, synthesized available project information, explored and analyzed uncertainties and risks, provided a qualitative and quantitative assessment of ranges of forecasted cost and schedule; described the analytical methods used, considered risk mitigation options and alternatives including use of cost and schedule contingencies; and drew conclusions. The Report also provides recommendations for adjustment to scope, cost, schedule and project management planning activities in order to respond to project risks.

HART's formal response to the recommendations set out in the Report should be provided to FTA within thirty (30) of receipt of the Report. Any questions about the Report should be directed to Bernardo Bustamante, Director of the Office of Program Management and Oversight, at (415) 744-3113, or bernardo.bustamante@dot.gov.

Sincerely,


Leslie T. Rogers
Regional Administrator

Enclosure

PMOC REPORT

2014 Risk Refresh

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

July 2014 (FINAL)

PMOC Contract Number: DTFT60-09-D-00012

Task Order Number 5

Work Order Number 9

Project No. DC-27-5140

OPs Referenced: OP 1, OP 32C, 33, 34, 40

Jacobs Engineering Group, Inc., 501 North Broadway, St. Louis, MO 63102

Tim Mantych, P.E., (314) 335-4454, tim.mantych@jacobs.com

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

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Appendix A: List of Acronyms

1.0 EXECUTIVE SUMMARY

1.1 Introduction

The Honolulu Authority for Rapid Transportation (HART) continues to advance development of its Honolulu Rail Transit Project (“Project”) in accordance with the Federal Transit Administration (FTA) New Starts requirements.

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. The PMOC completed a Risk Refresh in 2012 prior to execution of the Full Funding Grant Agreement (FFGA) in December 2012. This report represents an updated Risk Refresh based on information provided by HART as of April 2014.

It should be noted that this assessment is an update of the assessment that was completed in advance of the FFGA. In addition, all legal litigations have been resolved since the last risk assessment. The PMOC reviewed any Project changes, including those changes as a result of litigation period impacts, that may affect the technical capacity and capability of the grantee as well as changes associated with Project’s current FFGA scope, schedule, cost estimate, and risk and contingency management.

1.2 PMOC Review

This report represents an update of the PMOC’s assessment at time of FFGA of HART’s technical capacity and capability as well as an assessment of the Project’s current FFGA scope, schedule, cost estimate, and risk and contingency management. This assessment is governed by the following FTA Oversight Procedures (OP):

- OP 21 – Technical Capacity and Capability 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

1.3 Findings/Recommendations

1.3.1 Technical Capacity and Capability (TCC) Review

The PMOC has assessed that the HART organization should be streamlined to be more effective. There is a sense that critical decisions are rendered “by committee”, which is not an effective means for management on a capital program of this magnitude. HART should consider identifying a Project Director who serves as the focal point for all capital program decisions. This will eliminate management by committee, expedite critical decisions, and help ensure strong schedule and contract management principles are implemented.

Recommendations

- (1) HART should identify a Project Director.
- (2) HART must complete the update of the Project Management Plan (PMP).
- (3) HART should identify a permanent Risk Manager.
- (4) HART and their consultant organization should be streamlined to be more effective (e.g. evaluate need for HART Construction Assistant Deputy; clearly define the roles and responsibilities of HART Project Manager and CE&I Resident Engineer; evaluate need for HART Assistant Project Managers).
- (5) HART must update its management plans to include the Assistant Deputy Director positions that weren't included in the most recent updates provided to the PMOC in March 2014.

1.3.2 Project Scope Review

There have been no significant changes to the scope of the Project since execution of the FFGA. The scope of the Project is well-defined and is generally at an appropriate level of completeness. The Project final design phase and construction phase are concurrent to an extent as a result of the hybrid contract packaging strategy that contains work packages for Design-Build (DB), Design-Bid-Build (DBB), and Design-Build-Operate-Maintain (DBOM). The awarded DB contracts are significantly more advanced than other portions of the project and have progressed through most of the design phase and into field construction, which resumed in September 2013. The DBB contracts remain in varying stages of final design.

The following observations were made with regard to the scope review:

- Scope is adequately defined.
- Level of completion varies across contract packages.
- There are still several outstanding issues:
 - Several third-party agreements have yet to be resolved.
 - Final operational analysis must be completed by Ansaldo Honolulu Joint Venture (AHJV).
 - A number of design issues that affect the interface with other contracts must be resolved.
 - HART has developed an extensive Contract Packaging Plan that will require significant management effort to ensure proper interface coordination.
 - There is concern whether bidding competition for the remaining packages will be strong enough to assure pricing within budget.
 - Cost estimates have not yet been prepared for a number of potential Contract Change Orders (CCO).
 - Real estate acquisition to support construction in the City Center Segment will require significant coordination and effort by HART.
 - HART is considering several proposed design changes that may require additional environmental review. It is not anticipated that any of these changes will significantly impact the Project implementation or planned operations. However, each proposed change must be properly vetted by each affected party.

Recommendations

- (1) Continue to review and vet all potential Contract Change Orders. Prepare cost estimates for any potential Contract Change Orders that cannot be eliminated at this time.
- (2) Continue to review all post-Record of Decision (ROD) changes to ensure they do not have an impact on the environmental documentation, the project scope, or future operations.
- (3) Prioritize resolution of required third-party agreements, real estate acquisitions, and coordination between various contractors and designers.

1.3.3 Project Schedule Review

The PMOC reviewed HART's Master Program Schedule (MPS) with a Data Date of February 28, 2014. The PMOC has assessed that the MPS remains achievable but contains little margin for error or delay to critical path and near critical path activities due to schedule compression. HART should also engage tighter management oversight over the Core Systems Contractor especially since they continue to slip critical schedule dates with vehicle design and manufacturing and systems design.

The following observations were made with regard to the schedule review:

- The FFGA Revenue Service Date (RSD) is January 31, 2020.
- HART's target RSD is March 29, 2019 and the MPS includes more than 300 calendar days of buffer float up to the FFGA RSD.
- The adjusted/stripped schedule RSD is February 7, 2019.
- HART MPS consists of the master schedule connected to multiple contractor's schedules. The CSC's AHJV schedule is the only one whose base calendar is a 7-day calendar due to it being mainly a manufacturing and procurement schedule.
- The current MPS contains more logic density and schedule-compression than ever before, which may require more concurrent utilization of resources. It is recommended that HART and consultant staff projections be re-visited as a result of this concurrent utilization.
- Most of the Risk Register items used by the PMOC in the schedule risk analysis are the same as the previous risk refresh.

Recommendations

- (1) HART and consultant staff projections should be re-visited as a result of projected concurrent utilization.
- (2) HART should require all construction contractors to consistently apply 5-day and 6-day-per-week calendars in lieu of 7-day-per-week calendars.
- (3) HART should revise its staffing plan to ensure that schedule compression has not caused excessive staff requirements during peak demand.
- (4) HART should withhold partial or full payment of contractor monthly pay applications if the contractors continue failing to submit timely and acceptable Critical Path Method (CPM) project schedule updates.
- (5) HART should consider placing a senior level scheduler in the CSC offices to support more aggressive schedule management oversight.

1.3.4 Project Cost Estimate

The FFGA Project Budget is \$5.122 billion, including \$644 million in allocated and unallocated contingency and \$173 million in financing costs. HART has stated that the Project is on budget while acknowledging that there has been pressure on the budget due to the year-long Archeological Inventory Survey (AIS) delay to the project and changing market conditions.

The PMOC evaluated the cost estimates for each Standard Cost Category (SCC) for mechanical soundness and consistency. These mechanical checks are used to determine if there are any material inaccuracies within the estimate. The estimate was found to be mechanically correct in the tabulation of the unit cost, application of factors, and translation to the SCC workbook. The estimate is reflective of the sequencing identified in the MPS.

The following specific observations were made with regard to the cost estimate review:

- The individual Bases of Estimates (BOE) are updated to match contract estimates. However, there was no uniformity across individual BOEs. For example:
 - The application of markups was inconsistent.
 - The application of the General Excise Tax (GET) varied.
 - Escalation rates varied between contracts.
- The cost estimate provided by HART excluded two contracts (MM-937 – ROW Engineering Support Services and MM-964 – Safety & Security Certification Consultant).
- Some components of estimate must be updated (e.g. soft costs, Right-of-way (ROW)).
- There are a number of possible change orders for which no cost has been associated.
- Several adjustments to the cost estimate are recommended.

Once all contingency was stripped, the PMOC incorporated the adjustments into the base cost of the project prior to completing the cost risk analysis. These adjustments totaled \$139.5 million:

- Revaluation of ROW and Temporary Construction Easements – \$7.4 million
- Costs for added HART/PMC positions – \$5.9 million
- MM-937 and MM-964 excluded from cost breakdown provided to PMOC – \$6.5 million
- HART adjustment for “Known changes” at time of analysis – \$32.5 million
- Potential Changes Identified with no associated estimate – \$25 million
- Disagreement in savings for change to 4-Car Trains – \$5 million
- Escalation component of delay settlement for WOFH/KHG/MSF – \$10 million
- Resolution of disputed Contract Change Orders – \$5 million
- HART adjustment for Stations – \$23.8 million
 - Westside Stations – \$8.9 million
 - Pearl Highlands Transit Center – \$10 million
 - Airport Station Group – \$5.6 million
 - Dillingham/Kaka’ako Station Group – \$0.7 million (Deduct)
- HART adjustment for Airport and City Center Guideway (rescue carts) – \$1.4 million
- Westside Stations Group adjustment based on CE&I estimate – \$17 million.

In addition, the Net Stripped, Adjusted Estimate includes \$177.6 million in forecast Change Orders that had previously been identified by HART.

Recommendations

- (1) HART should prepare cost estimates for all identified possible changes (contract change orders).
- (2) HART should focus on completion of the Airport & City Center Guideway Estimate to allow time for mitigation if there is a budget issue with this contract.
- (3) HART should refresh its ROW estimate to reflect current property costs and include costs for Temporary Construction Easements.
- (4) HART should refresh its personnel manpower charts to account for new positions and a refined schedule to verify the cost included in SCC 80 soft costs.
- (5) HART should re-baseline its budget following completion of the Risk Refresh activities.
- (6) HART should verify that its budgets and any ongoing estimate refresh include adequate funds for escalation.

1.3.5 Project Risk and Contingency Review

The PMOC has performed regular monitoring visits to the project and has refreshed its earlier risk assessment based upon an updated understanding of project risks and updated schedule and cost information provided by HART. In April 2014, the PMOC participated in a risk refresh workshop with HART, the purpose of which was to discuss HART's progress in its risk management efforts, and to discuss PMOC's observations and reflections from PMOC's initial review of HART's updated scope, cost, schedule, and risk information.

For the purposes of its risk refresh, the PMOC considered the project in three separate elements, which are termed here as "risk profiles":

- **Risk Profile 1** is associated with currently-contracted direct cost work;
- **Risk Profile 2** is associated with yet-to-be-contracted direct cost work; and
- **Risk Profile 3** is associated with "soft costs".

Cost Risk Analysis

During the April 2014 risk workshop, information was provided indicating that HART was aware of additional costs that should be included, and which were added by the PMOC as estimate adjustments, along with PMOC's independent estimate adjustments. The PMOC has prepared this risk refresh based upon additional information provided by HART after the workshop. The PMOC found that the HART's risk identification effort, including its risk mitigation activities, generally conforms to its documented processes.

The cost risk assessment recognized general reductions in risk due to advancement of design. However, little additional construction has occurred and so no major changes in construction risk were made. Further, the project delay has caused the bidding effort to occur during an increase in the construction market, which adds market risk to the model. A major influence in the risk for Risk Profile 2 is market risk due to an increasingly strong construction market both at the project location and on the west coast of the U.S.

It is recognized that efforts have been made to recover contingency levels through cost reduction measures, value engineering, and revised project delivery strategies. However, these types of changes are becoming increasingly less likely.

The PMOC basis of the stripped, adjusted estimate for cost risk modeling is as follows:

Project Budget	\$5,122
HART Current Available Contingency	\$463
Financing	\$173
Net Stripped Estimate	\$4,486
PMOC Adjustments	\$139.5
Net Stripped, Adjusted Estimate	\$4,625

With adjustments of \$139.5 million, the current contingency is reduced to \$323.5 million (7% of the adjusted, stripped estimate). This level of contingency would be commensurate with a project that is completely bid and has progressed in construction beyond the point of being “in the ground”. Considering the project progress to date is 22%, this current level of contingency would only reflect an approximate achievable probability of 42%.

The predicted FTA model outcome is \$5,214 million (excluding finance costs). This includes \$588 million in recommended contingency (13% of the adjusted, stripped estimate). HART’s estimate falls short of the predicted FTA model outcome by \$265 million (\$139.5 million in recommended adjustments plus \$125.5 million in additional recommended contingency). There is a 5.4% difference between HART’s project estimate of \$4,949 million and the predicted FTA model outcome of \$5,214 million.

The recommended estimate represents the median value from the FTA risk assessment model, when adjusted for the specifics of this project. The historic trend indicates 40%-likely to 80%-likely range of \$5,101 million to \$5,670 million.

The RCMP includes several potential Secondary Mitigation options. However, there is a general lack of detailed development of plans and cost estimates for the items identified in the RCMP.

Recommendations

- (1) HART’s estimate falls short of the predicted FTA model outcome by \$265 million (\$139.5 million in recommended adjustments plus \$125.5 million in additional recommended contingency). HART should review its project estimate and determine how to reduce costs to close this gap.
- (2) The PMOC-recommended amount of secondary mitigation is \$195.5 million.
- (3) The RCMP must be updated to strengthen risk contingency tracking, custody, and reporting. The RCMP should include an updated contingency draw-down curve that reflects the current contingency balance and more accurate drawdown milestones. Diligence and vigilance must continue to be applied to this effort to avoid a rapid contingency usage that could ultimately leave the project unprotected.
- (4) HART should update and continue its tracking of the Secondary Mitigation items,

and develop a process by which those items may be priced by the bidders of the remaining work at the time of bidding. This strategy avoids attempting to trigger Secondary Mitigation after receipt of bids or after contracting, at which point the cost reduction may be significantly reduced due to lack of competitive forces.

- (5) Strong controls must be put in place immediately to avoid future rapid contingency reduction. The frequency and the levels of project management to which these statistics are reported should be improved and monitored monthly.
- (6) The PMOC and HART should engage in a focused “cost containment workshop” on a monthly basis to monitor the efforts taken to avoid rapid contingency usage.

Schedule Risk Analysis

HART’s target Revenue Service Date is March 2019. The FFGA Date is January 31, 2020. The Impacted Risk Model (IRM) distribution range for project completion from the 0% to 100% confidence levels span a 549-day period. The probability percentage points for the IRM are:

- 20% Confidence level completion date: 20-Aug-19
- 50% Confidence level completion date: 17-Dec-19
- 75% Confidence level completion date: 20-Feb-20
- 90% Confidence level completion date : 20-Apr-20
- 100% Confidence level completion date: 31-Jul-20

The probability confidence level for achieving project completion by January 2020, the FFGA RSD, has been reduced by 15-20% since the last Risk Assessment refresh in July 2012. The Schedule Risk Analysis indicates 66-70% probability of completing the project by the FFGA RSD of 31-Jan-20. The schedule risk analyses using the OP40 calculation indicates a recommended RSD of July 13, 2020.

The FFGA RSD of January 2020 can be achieved; however, HART must implement strong schedule and contract management throughout the remainder of the project.

Recommendations

- (1) HART should closely monitor the MPS longest critical path and near critical paths as a means to prevent depletion of project total float to achieve RSD by January 2020.
- (2) HART should revise its staffing plan to ensure that schedule compression has not caused excessive staff requirements during peak demand during construction.
- (3) The PMOC and HART should engage in focused “schedule containment workshops” on a monthly basis to monitor the efforts taken to achieve the FFGA RSD.

2.0 INTRODUCTION

The Honolulu Authority for Rapid Transportation (HART) continues to advance development of its Honolulu Rail Transit Project (“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.

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 Risk and Contingency Management.

The PMOC completed a Risk Refresh in 2012 prior to execution of the Full Funding Grant Agreement (FFGA) in December 2012. This report represents an updated Risk Refresh based on information provided by HART as of April 2014.

It should be noted that this assessment is an update of the assessment that was completed in advance of the FFGA. In addition, all legal litigations have been resolved since the last risk assessment. The PMOC reviewed any Project changes, including those changes as a result of litigation period impacts, that may affect the technical capacity and capability of the grantee as well as changes associated with Project’s current FFGA scope, schedule, cost estimate, and risk and contingency management.

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 Project is an approximately 20-mile 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. HART plans to deliver the Project in four guideway segments:

- Segment I (West Oahu/Farrington Highway/WOFH) – East Kapolei to Pearl Highlands (6 miles/7 stations)
- Segment II (Kamehameha Highway/KH) – 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)

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

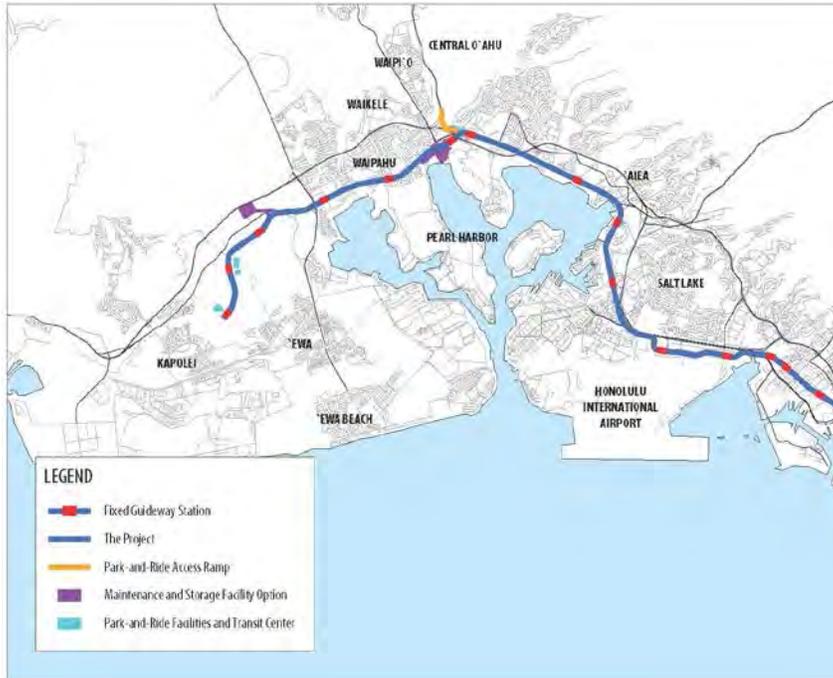
Figure 1. Project Map Showing Line Segments



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).
- **Grantee's Target Revenue Service Date (RSD):** March 2019

Figure 2. Project Map



2.3 Project Status

The Full Funding Grant Agreement (FFGA) was executed on December 19, 2012. Final Design activities are continuing for a large portion of the Project, and construction activities have begun in the West Oahu/Farrington Highway and Kamehameha Highway segments and the Maintenance and Storage Facility.

2.4 Project Budget

The FFGA Project Budget is \$5.122 billion in Year-of-Expenditure (YOE) dollars, including \$644 million in allocated and unallocated contingency and \$173 million financing costs.

Through March 2014, HART expended \$904.5 million and reported a balance of \$608.2 million in contingency. However, HART's forecast for contingency usage indicated an available balance of \$423.8 million.

Table 3. 2014 Adjusted Base Cost Estimate (\$M)

SCC	Description	HART Current Budget ¹	Allocated Contingency ²	Total w/o Contingency ¹	Adjustments ²	Adjusted BCE
10	Guideway & Track Elements	1,299,822,278	162,179,982	1,137,642,296	75,712,912	1,213,355,208
10.04	Guideway: Aerial structure	1,195,800,651	153,386,755	1,042,413,896	59,258,703	1,101,672,599
10.08	Guideway: Retained cut or fill	6,973,415	537,159	6,436,256	1,165,177	7,601,433
10.09	Track: Direct fixation	90,462,039	7,599,249	82,862,790	14,714,643	97,577,433
10.11	Track: Ballasted	2,923,035	225,160	2,697,875	488,405	3,186,280
10.12	Track: Special (switches, turnouts)	3,663,139	431,660	3,231,479	85,894	3,317,463
20	Stations, Stops, Terminals, Intermodals	483,938,837	87,272,569	396,666,268	16,300,000	412,996,268
20.01	At-grade station	7,420,693	1,309,361	6,111,332	0	6,111,332
20.02	Aerial station	331,162,203	57,998,746	273,163,457	16,300,000	289,463,457
20.06	Automobile parking multi-story structure	79,690,518	13,281,753	66,408,765	0	66,408,765
20.07	Elevators, escalators	65,665,423	14,682,709	50,982,714	0	50,982,714
30	Support Facilities: Yards, Shops, Admin.	113,037,249	8,680,192	104,357,057	23,566,903	127,923,960
30.02	Light Maintenance Facility	8,217,846	631,053	7,586,793	1,713,322	9,300,115
30.03	Heavy Maintenance Facility	42,485,010	3,262,447	39,222,563	8,857,612	48,080,175
30.04	Storage or Maintenance of Way Building	8,541,975	655,943	7,886,032	1,780,899	9,666,931
30.05	Yard and Yard Track	53,792,419	4,130,749	49,661,669	11,215,070	60,876,740
40	Sitework & Special Conditions	1,084,906,182	128,616,712	956,289,470	119,779,617	1,076,069,087
40.01	Demolition, Clearing, Earthwork	32,194,824	4,522,813	27,672,011	843,636	28,515,647
40.02	Site Utilities, Utility Relocation	355,379,490	51,485,547	303,893,943	8,281,622	312,175,565
40.03	Haz. material, contaminated soil removal/mitig	1,400,811	231,903	1,168,908	3,632	1,172,540
40.04	Environmental mitigation	36,144,458	4,188,535	31,955,923	1,534,841	33,490,764
40.05	Site structures (retaining walls, sound walls)	9,752,797	691,423	9,061,374	18,668,873	27,730,247
40.06	Pedestrian / bike access, landscaping	49,302,959	7,429,919	41,873,040	6,389,602	48,262,642
40.07	Automobile, bus accessways (roads, parking)	200,108,610	29,709,250	170,399,360	4,999,842	175,399,202
40.08	Temporary Facilities/other indirect costs	400,622,233	30,357,322	370,264,911	79,057,567	449,322,478
50	Systems	270,399,210	24,718,087	245,681,123	15,861,261	261,542,384
50.01	Train control and signals	115,240,968	10,022,272	105,218,696	5,967,134	111,185,830
50.02	Traffic signals and crossing protection	12,301,603	2,050,267	10,251,336	0	10,251,336
50.03	Traction power supply: substations	33,910,327	2,883,016	31,027,311	1,758,895	32,786,206
50.04	Traction power distribution	35,070,608	3,352,161	31,718,447	4,087,511	35,805,958
50.05	Communications	59,996,794	5,203,351	54,793,443	3,329,076	58,122,519
50.06	Fare collection system and equipment	10,096,140	878,041	9,218,099	522,774	9,740,873
50.07	Central Control	3,782,271	328,980	3,453,791	195,870	3,649,661
	CONSTRUCTION SUBTOTAL (10 - 50)	3,252,103,757	411,467,543	2,840,636,214	251,220,693	3,091,856,907

SCC	Description	HART Current Budget ¹	Allocated Contingency ²	Total w/o Contingency ¹	Adjustments ²	Adjusted BCE
60	ROW, Land, Existing Improvements	219,819,371	22,143,624	197,675,747	7,486,975	205,162,722
60.01	Purchase or lease of real estate	199,347,711	19,987,047	179,360,664	6,830,126	186,190,790
60.02	Relocation of existing households/businesses	20,471,660	2,156,577	18,315,083	656,850	18,971,933
70	Vehicles	209,787,838	18,244,821	191,543,017	20,862,735	212,405,752
70.01	Light Rail	189,081,069	16,443,996	172,637,073	19,790,546	192,427,619
70.06	Non-revenue vehicles	14,267,350	1,240,802	13,026,548	738,758	13,765,306
70.07	Spare parts	6,439,419	560,023	5,879,396	333,431	6,212,827
80	Professional Services	1,178,173,903	100,047,774	1,078,126,129	37,589,728	1,115,715,857
80.01	Preliminary Engineering	124,962,785	6,632,905	118,329,880	9,344,848	127,674,727
80.02	Final Design	232,869,193	32,095,148	200,744,044	12,014,809	212,788,853
80.03	Project Management for Design/Construction	382,704,988	19,570,239	363,134,749	5,877,733	369,012,484
80.04	Construction Administration & Management	174,938,380	13,112,698	161,825,682	94,717	161,920,399
80.05	Professional Liability/Non-Construction Insurance	39,803,072	4,586,756	35,216,316	158,194	35,374,510
80.06	Legal; Permits; Review Fees by other agencies	78,714,481	8,997,171	69,717,310	5,000,000	74,717,310
80.07	Surveys, Testing, Investigation, Inspection	72,964,682	8,640,605	64,324,077	2,432,494	66,756,571
80.08	Start up	71,216,324	6,412,253	64,804,071	2,666,935	67,471,006
	SUBTOTAL (10 - 80)	4,859,884,869	551,903,762	4,307,981,107	317,160,131	4,625,141,238
90	Unallocated Contingency	88,750,055	88,750,055	0	0	0
90	Latent Contingency	0	0	0	0	0
	SUBTOTAL (10 - 90)	4,948,634,924	640,653,817	4,307,981,107	317,160,131	4,625,141,238
100	Finance Charges	173,058,243	0			
	TOTAL PROJECT COST (10 - 100)	5,121,693,167	640,653,817			

¹Based on data provided by HART as of February 2014.

²Includes both HART Forecast Change Orders (\$177.65M) and PMOC Recommended Adjustments (\$139.51M).

2.5 Project Schedule

The Revenue Service Date (RSD) identified in the FFGA is January 31, 2020. HART's current target date for the start of full revenue operations is March 2019. HART intends to begin partial revenue service from East Kapolei Station to Aloha Stadium Station in June 2017.

2.6 Project Management Oversight Contractor (PMOC)

This report represents an update of the PMOC's assessment at time of FFGA of HART's technical capacity and capability as well as an assessment of the Project's current FFGA scope, schedule, cost estimate, and risk and contingency management. This assessment is governed by the following FTA Oversight Procedures (OP):

- OP 21 – Technical Capacity and Capability 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

2.7 Evaluation Team

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

Table 1. PMOC Evaluation Team

Name	Firm	Role
Tim Mantych	Jacobs	Program Manager
Bill Tsiforas	Jacobs	Task Order Manager
Keith Konradi	Jacobs	Rail Engineering
Bob Niemietz	Jacobs	Structural Engineering
Allan Zreet	Jacobs	Architect
Charles Neathery	Jacobs	Construction Management, Project Controls, Schedule Risk Assessment
Tim Morris	Jacobs	Cost Estimating
Arun Virginkar	Virginkar and Associates	Vehicles, Systems
Bob Merryman	OR Colan	Real Estate
Dorothy Schulz	Interactive Elements Inc.	Safety and Security
David Sillars	Independent Contractor	Risk Manager

3.0 TECHNICAL CAPACITY AND CAPABILITY REVIEW

The PMOC reviewed HART's organization, policies and procedures in accordance with *OP 21: Grantee Technical Capacity and Capability Review* dated May 2010, to determine whether there had been any significant changes that would affect management of the Project.

3.1 PMOC Assessment

The PMOC previously expressed concern that HART may continue experiencing difficulty attracting and retaining the experienced staff needed for long-term project assignment and permanent HART employment (post-Project) given Hawaii's geographic isolation, salary limits, and high cost of living relative to the mainland. It was recommended that HART adhere to the staffing plan to address the transition of staff during the final design and construction phases for positions currently occupied by PMC staff to HART staff.

The PMOC also recommended that HART must strive to transition the key management positions currently occupied by the PMC and General Engineering Consultant (GEC) as early as possible. This transition is necessary in order for HART to have more ownership and maintain stronger continuing control of the project without having to rely too heavily on the PMC and GEC.

There are currently several key positions that remain vacant. The most critical positions that HART is diligently working to permanently fill include:

- Deputy Director of Construction
- Risk Manager
- Assistant Deputy Directors (5)

HART has improved recruitment and hiring of additional Project staff. HART will use the GEC III to fill the Risk Manager position on an interim basis. However, the Assistant Deputy Directors were not included in the Staffing and Succession Plan recently reviewed by the PMOC.

HART recently submitted the following management plans and procedures for review:

- Resident Engineers Manual for DB (dated March 5, 2014)
- Resident Engineers Manual for DBB (dated March 6, 2014)
- Quality Management Plan (dated March 4, 2014)
- Staffing and Succession Plan (dated March 5, 2014)
- Construction Management Plan (dated March 7, 2014)
- Change Management Plan (dated March 7, 2014 and previously identified as Configuration Management Plan)
- Contract Change Procedure 5CA-11 (dated March 7, 2014)

The PMOC has reviewed these plans/procedures and provided comments to HART. HART is in the process of updating several additional management plans including its Project Management Plan (PMP).

The PMOC has assessed that the HART organization should be streamlined to be more effective. There is a sense that critical decisions are rendered “by committee”, which is not an effective means for management on a capital program of this magnitude. HART should consider identifying a Project Director who serves as the focal point for all capital program decisions. This will eliminate management by committee, expedite critical decisions, and help ensure strong schedule and contract management principles are implemented.

3.2 PMOC Recommendations

- (1) HART should identify a Project Director.
- (2) HART must complete the update of the Project Management Plan (PMP).
- (3) HART should identify a permanent Risk Manager.
- (4) HART and their consultant organization should be streamlined to be more effective (e.g. evaluate need for HART Construction Assistant Deputy; clearly define the roles and responsibilities of HART Project Manager and CE&I Resident Engineer; evaluate need for HART Assistant Project Managers).
- (5) HART must update its management plans to include the Assistant Deputy Director positions that weren't included in the most recent updates provided to the PMOC in March 2014.

4.0 PROJECT SCOPE REVIEW

The PMOC reviewed the Project in accordance with *OP 32C: Project Scope Review* and *OP 32D: Project Delivery Method Review*, both dated May 2010, to determine whether there had been any significant changes regarding the scope of the Project.

4.1 PMOC Assessment

In general, there have been no significant changes to the scope of the Project since execution of the FFGA. The scope of the Project is well-defined and is generally at an appropriate level of completeness. The Project final design phase and construction phase are concurrent to an extent as a result of the hybrid contract packaging strategy that contains work packages for DB, DBB, and DBOM. The awarded DB contracts are significantly more advanced than other portions of the project and have progressed through most of the design phase and into field construction, which resumed in September 2013 following suspension to complete the Archaeological Inventory Survey per the Hawaii Supreme Court ruling. The DBB contracts remain in varying stages of final design. It is advisable to acknowledge the project risks to completing the project on schedule and within budget, given the varying level of completion of the final design documents.

PMOC primarily focused its review on those contract packages that have not yet been bid or have been significantly advanced since time of the FFGA. These contract packages include:

Table 2. Updated Contract Packages

Contract ID	Contract Description
DBOM920	Core Systems Contract (CSC) Design-Build-Operate-Maintain
DBB185	Westside (WOSG, FHSG, KHSG) Station Group Construction
DBB470	Airport Station Group Construction
DBB505	Airport Section Utility Relocation Contract
DBB595	Airport/City Center Guideway Construction + City Center Utility Relocation
DBB580	Dillingham / Kaka'ako (Eastside) Station Group Construction

The drawings for the four line segments present right-of-way plans, drainage plans and details, demolition plans, guideway plans and profiles, typical cross sections, utility plans, roadway plans, signing and striping plans, maintenance of traffic plans, traffic signal plans, street lighting plans, structural drawings, landscaping plans, station drawings, and contact rail installation plans. The West Oahu/Farrington Highway (WOFH), Kamehameha Highway (KHG), and MSF DB contracts have progressed beyond the others as they near completion of final design as they have proceeded into construction.

The following observations were made with regard to the scope review:

- Scope is adequately defined.
- Level of completion varies across contract packages.
- There are still several outstanding issues:
 - Several third-party agreements have yet to be resolved.

- Final operational analysis must be completed by Ansaldo Honolulu Joint Venture (AHJV).
- A number of design issues that affect the interface with other contracts must be resolved.
- HART has developed an extensive Contract Packaging Plan that will require significant management effort to ensure proper interface coordination.
- There is concern whether bidding competition for the remaining packages will be strong enough to assure pricing within budget.
- Cost estimates have not yet been prepared for a number of potential Contract Change Orders (CCO).
- Real estate acquisition to support construction in the City Center Segment will require significant coordination and effort by HART.
- HART is considering several proposed design changes that may require additional environmental review. It is not anticipated that any of these changes will significantly impact the Project implementation or planned operations. However, each proposed change must be properly vetted by each affected party.

4.2 PMOC Recommendations

- (1) Continue to review and vet all potential Contract Change Orders. Prepare cost estimates for any potential Contract Change Orders that cannot be eliminated at this time.
- (2) Continue to review all post-ROD changes to ensure they do not have an impact on the environmental documentation, the project scope, project cost, project schedule, or future operations.
- (3) Prioritize resolution of required third-party agreements, real estate acquisitions, and coordination between various contractors and designers.

5.0 PROJECT SCHEDULE REVIEW

The PMOC reviewed the Project in accordance with *FTA OP 34: Project Schedule Review* dated May 2010 to assess and evaluate HART's project schedule.

5.1 PMOC Assessment

The PMOC reviewed HART's Master Program Schedule (MPS) with a Data Date of February 28, 2014. The following observations were made with regard to the schedule review:

- The FFGA RSD is January 31, 2020.
- HART's target Revenue Service Date (RSD) is March 29, 2019 and the MPS includes more than 300 calendar days of buffer float up to the FFGA RSD.
- The adjusted/stripped schedule RSD is February 7, 2019.
- HART MPS consists of the master schedule connected to multiple contractor's schedules. The CSC's AHJV schedule is the only one whose base calendar is a 7-day calendar due to it being mainly a manufacturing and procurement schedule.
- The current MPS contains more logic density and schedule-compression than ever before, which may require more concurrent utilization of resources. It is recommended that HART and consultant staff projections be re-visited as a result of this concurrent utilization.
- Most of the Risk Register items used by the PMOC in the schedule risk analysis are the same as the previous risk refresh.

The PMOC incorporated the following adjustments to schedule prior to completing the schedule risk analysis:

- Removed/dissolved "buffer" float activities.
- Minor mechanical corrections were made based on results of Schedule Analyzer:
- Removed constraint date(s).
- Added logic and modified lags to reduce excessive float.
- Incorporated logic and relationship/lag adjustments to reduce excessive float.
- Estimate Uncertainty modeling will account for activity duration adjustments.
- No adjustments were made to the calendar library.

In general, the PMOC has assessed that the MPS remains achievable but contains little margin for error or delay to critical path and near critical path activities due to schedule compression. HART should also engage tighter management oversight over the Core Systems Contractor especially since they continue to slip critical schedule dates with vehicle design and manufacturing and systems design.

5.2 PMOC Recommendations

- (1) HART and consultant staff projections should be re-visited as a result of projected concurrent utilization.
- (2) HART should require all construction contractors to consistently apply 5-day and 6-day-per-week calendars in lieu of 7-day-per-week calendars.

- (3) HART should revise its staffing plan to ensure that schedule compression has not caused excessive staff requirements during peak demand.
- (4) HART should withhold partial or full payment of contractor monthly pay applications if the contractors continue failing to submit timely and acceptable CPM project schedule updates.
- (5) HART should consider placing a senior level scheduler in the CSC offices to support more aggressive schedule management oversight.

6.0 PROJECT COST ESTIMATE REVIEW

The PMOC followed the requirements outlined in the *FTA OP 33: Capital Cost Estimate Review*, dated May 2010, to assess and evaluate changes to HART's FFGA cost estimate.

6.1 PMOC Assessment

The Project Budget is \$5.122 billion, including \$644 million in allocated and unallocated contingency and \$173 million in financing costs. HART has stated that the Project is on budget while acknowledging there has been pressure on the budget due to the year-long Archeological Inventory Survey (AIS) delay to the project and changing market conditions.

The PMOC evaluated the cost estimates for each SCC for mechanical soundness and consistency. These mechanical checks are used to determine if there are any material inaccuracies within the estimate. The estimate was found to be mechanically correct in the tabulation of the unit cost, application of factors, and translation to the SCC workbook. The estimate is reflective of the sequencing identified in the MPS.

Given the various formats of the composite Project Cost Estimate, the PMOC had some difficulty completing the analysis. The current estimate is a combination of an Estimate at Completion (EAC) or Contract tally with allowances of various types for change orders or issues. At present, approximately half of the construction work is awarded and the remaining work is "estimated" from varied sources or entities. Some of the budget costs are based on estimates from the original FFGA but were not updated for this Risk Assessment refresh. The contract change orders, especially for the construction contracts, are at best uncertain as many of the issues do not have an associated agency estimate.

A significant setback occurred with the federal/state lawsuits for most of 2013 and this cost has been partially captured by HART change orders or adjustments included in the PMOC's analysis. However, the net result is that the agency has eroded the project contingency without making any significant progress in the work, construction contract awards, acquisition of right of way, or lessening of the project's risks. The time loss is concerning as the stations, real estate procurement, and east sections of the guideway will be bid in a market that may be less favorable for the owner.

The City Center and Airport Guideways with Utilities will require HART to purchase ROW in the costliest areas of the project with significant utility and construction challenges. The current HART budget relies generally on the FFGA budget for this portion of the work as an update based on more recent engineering was not complete at the time of the risk refresh. The updated estimate for this contract will not be available until June or July 2014. HART is fully aware of the importance of this large contract as it has the potential to require a large share of the contingency if the bids are higher than originally anticipated at FFGA.

Escalation was discussed in general terms at the April 2014 Risk Refresh Workshop, but it is unclear if HART's budget adequately addresses this project risk. Once the contracts are awarded this risk should decline significantly, but the PMOC recommends for the interim that HART verify that its budgets and any ongoing estimate refresh efforts include adequate funds for

escalation.

The following specific observations were made with regard to the cost estimate review:

- The individual Bases of Estimates (BOE) are updated to match contract estimates. However, there was no uniformity across individual BOEs. For example:
 - The application of markups was inconsistent.
 - The application of the General Excise Tax (GET) varied.
 - Escalation rates varied between contracts.
- The cost estimate provided by HART excluded two contracts (MM-937 – ROW Engineering Support Services and MM-964 – Safety & Security Certification Consultant).
- Some components of estimate must be updated (e.g. soft costs, ROW).
- It was unclear how increased costs for the Owner Controlled Insurance Program were handled, but clarification was subsequently provided by HART.
- There are a number of possible change orders for which no cost has been associated (see table below).
- Several adjustments to the cost estimate are recommended.

Table 3. Summary of Contract Change Orders (CCO)

Category	Number
Executed CCOs	108
Pending Changes	22
Probable/Potential Changes	57
Issues/Possible	143
Issues/Possible w/out Estimate*	90
Disputed	10

63% of the Issues/Possible do not have associated cost estimate.

Once all contingency was stripped, the PMOC incorporated the adjustments into the base cost of the project prior to completing the cost risk analysis. These adjustments totaled \$139.5 million:

- Revaluation of ROW and Temporary Construction Easements – \$7.4 million
- Costs for added HART/PMC positions – \$5.9 million
- MM-937 and MM-964 excluded from cost breakdown provided to PMOC – \$6.5 million
- HART adjustment for “Known changes” at time of analysis – \$32.5 million
- Potential Changes Identified with no associated estimate – \$25 million
- Disagreement in savings for change to 4-Car Trains – \$5 million
- Escalation component of delay settlement for WOFH/KHG/MSF – \$10 million
- Resolution of disputed Contract Change Orders – \$5 million
- HART adjustment for Stations – \$23.8 million
 - Westside Stations – \$8.9 million
 - Pearl Highlands Transit Center – \$10 million
 - Airport Station Group – \$5.6 million
 - Dillingham/Kaka’ako Station Group – \$0.7 million (Deduct)
- HART adjustment for Airport and City Center Guideway (rescue carts) – \$1.4 million

- Westside Stations Group adjustment based on CE&I estimate – \$17 million.

In addition, the Net Stripped, Adjusted Estimate includes \$177.6 million in forecast Change Orders that had previously been identified by HART.

Table 4. HART Forecast of Change Orders (February 2014)

Category	Estimate (\$M)
Pending Changes	\$35.35
Probable/Potential Changes	\$75.89
Issues/Possible*	\$66.41
Total	\$177.65

*Includes \$18.1 million in credits that have already been included in HART Cost Estimate (February 2014 HART Budget , ref. MM-900 & MM-901)

Following is a summary of the Adjusted Stripped Base Cost Estimate (BCE):

Table 5. Adjusted Stripped BCE

HART Estimate	\$4,307.98
Allocated Contingency	\$551.90
Unallocated Contingency	\$88.75
Financing	\$173.06
TOTAL	\$5,121.69
Stripped Cost	\$4,307.98
HART Forecast CCOs	\$177.65
PMOC Adjustments	\$139.51
Adjusted Stripped BCE	\$4625.14
Incurred Costs (as of March 2014)	\$904.5

All values in \$M

6.2 PMOC Recommendations

- (1) HART should prepare cost estimates for all identified possible changes (contract change orders).
- (2) HART should focus on completion of the Airport & City Center Guideway Estimate to allow time for mitigation if there is a budget issue with this contract.
- (3) HART should refresh its ROW estimate to reflect current property costs and include costs for Temporary Construction Easements.
- (4) HART should refresh its personnel manpower charts to account for new positions and a refined schedule to verify the cost included in SCC 80 soft costs.
- (5) HART should re-baseline its budget following completion of the Risk Refresh activities.
- (6) HART should verify that its budgets and any ongoing estimate refresh include adequate funds for escalation.

7.0 PROJECT RISK

7.1 Purpose

Per FTA Oversight Procedure (OP) 40, PMOC has performed “an evaluation of the reliability of the grantee’s project scope, cost estimate, and schedule, with special focus on the elements of uncertainty associated with the effectiveness and efficiency of the grantee’s project implementation and within the context of the surrounding project conditions.” Through the process of risk and contingency review, the PMOC attempts to aid the grantee in its efforts to better define the project’s risks and to provide avenues for recovery should those risks become reality.

The purpose of this report is to provide a refresh of recommendations for adjustments to scope, cost, schedule, and project delivery options and to consider risk identification and risk mitigation options and alternatives, particularly in regard to contingencies, in order to respond to established project risks. This report is produced to establish the Project’s ability to complete on time and within the identified budget. This report is based on information provided by HART as of April 2014.

7.2 Methodology

The purpose of this section is to describe the review and evaluation methodology utilized by the PMOC with regards to HART’s identification of project risk and its plans for mitigating and managing these risks, including the use of schedule and cost contingencies.

The PMOC is required to synthesize available project information, explore and analyze uncertainties and risks, and provide a qualitative and quantitative assessment of ranges of forecasted cost and schedule. The PMOC reviewed risk mitigation options and alternatives, including use of cost and schedule contingencies.

The risk refresh requires an evaluation of the reliability of HART’s project scope, cost estimate, and schedule, with specific focus on the elements of uncertainty normally associated with the implementation of the project. PMOC reviewed scope, cost, and schedule documents and presented these reviews in separate spot reports on each topic. The objective of this refresh is to assess changes in the project risks and uncertainties associated with project conditions and the effectiveness and efficiency of project implementation in identifying and mitigating risks in regard to scope, cost and schedule. This report provides a qualitative and quantitative assessment of the ranges of forecasted cost and schedule and project management planning in order to respond to project risk. The PMOC’s refresh is understood to be a critical input to FTA’s decision regarding project advancement and funding.

The PMOC has performed regular monitoring visits to HART’s project and has refreshed the PMOC’s earlier risk assessment based upon an updated understanding of project risks and updated schedule and cost information provided by HART. In April 2014, the PMOC participated in a risk refresh workshop with HART, the purpose of which was to discuss HART’s progress in its risk management efforts, and to discuss PMOC’s observations and reflections from PMOC’s initial review of HART’s updated scope, cost, schedule, and risk information.

For the purposes of its risk refresh, the PMOC considered the project in three separate elements, which are termed here as “risk profiles”:

- **Risk Profile 1** is associated with currently-contracted direct cost work;
- **Risk Profile 2** is associated with yet-to-be-contracted direct cost work; and
- **Risk Profile 3** is associated with “soft costs.”

7.3 Risk Identification

The PMOC has reviewed HART’s updated risk register and has found that HART has been reasonably diligent in its efforts to track and revise its risk register through internal project risk tracking processes. In its review of the project’s scope, estimate, and schedule, the PMOC did not develop any recommendations for adjustment to HART’s risk register.

7.4 Contract Packaging

HART is utilizing both traditional (Design/Bid/Build or DBB) and alternative (Design/Build or DB and Design/Build/Operate/Maintain or DBOM) project delivery methods for the various contracts. The WOFH DB Contract, KHG DB Contract, MSF DB Contract, and the CSC DBOM have all been selected and contracted. The majority of the remaining work (Airport and City Center Guideway and Utilities and stations) is anticipated to be procured utilizing a traditional DBB method. HART is utilizing DB for the Pearl Highlands Station, Parking Structure and H-1 Ramps. To achieve expected market efficiencies and in hope of reducing cost, elements of this work have been consolidated into larger packages than earlier planned.

7.5 Cost Risk Assessment

This section includes the PMOC refresh of the cost risk of the project, based on the PMOC’s review of HART’s capital cost estimate. This section also describes the Beta Range Factor (BRF) assignments for the SCC Risk Assessment utilized in the FTA Risk and Contingency Review Workbook. Finally, the cost risk evaluation is described and the results are reported.

7.5.1 Methodology

Cost risk evaluation is a combination of the PMOC’s professional judgment and objective cost data to summarize and make adjustments to HART’s cost estimate. This is in addition to a rational and empirical application of a risk model analysis used to simulate the magnitude of project risk and establish the potential responses to manage the risk. In the context of the project risk evaluation, quantitative risk assessment is utilized in the analysis of risk exposure and the corresponding management of uncertainty. The PMOC utilized the following steps for the cost risk analysis of the project:

- (1) The PMOC conducted a cost review of the estimates of the project budget. The results of the PMOC review include an adjusted cost estimate that represents a more likely base cost of the project costs. For the project, HART costs are largely based on detailed and parametric estimating procedures, utilizing industry standards and pricing recently received on contracts for this project.
- (2) A Stripped Cost Estimate was then developed from the adjusted cost estimate.

The PMOC removed contingency funds embedded in the adjusted estimate, including both contingencies allocated by SCC and general unallocated contingencies. The PMOC interviewed HART's estimating staff to determine the extent to which latent (hidden) contingencies existed within the estimate, and found no latent contingency to review. The resulting Adjusted Cost Estimate was reported in YOE dollars.

- (3) A likely range of costs was then established, utilizing the FTA Risk and Contingency Review Workbook. The Adjusted Cost Estimate for each SCC Cost Element was then established as the lower bound value of the SCC Element Cost Range. The upper bound of the SCC Cost Element range is established through multiplying the lower bound value by a BRF, i.e., upper bound = BRF*lower bound.
- (4) For the Project, the Adjusted Estimate was divided between Risk Profiles 1, 2, and 3, as described earlier.
- (5) BRF values were established by the PMOC through a process that initially utilized the guidelines indicated in OP 40 and then adjusted the Beta Factors based upon specific project situations and identified risks. An example is that, for the project, the design and market factors for the DB and DBOM work warranted much lower beta factors than other cost categories, since their design and market prices are largely established. With previously developed information from the risk registers, an assessment of appropriate beta factors for the risk worksheet was made. This assessment occurred independently for each Risk Profile.
- (6) Once the Beta values were assigned to each portion of work, the resulting Risk Profiles were combined to develop an overall project risk assessment, including establishment of a target budget and recommended contingencies. These results provided a basis for evaluation of HART's budget and contingencies.

7.5.2 SCC Adjustments

The PMOC used its professional judgment as well as evaluation of objective data to develop its assessment of the Project costs and to develop the indicated adjustments. Adjustments noted below include changes proposed by the PMOC as well as changes proposed by HART, largely as a result of the April 15, 2014 Risk Workshop, and includes some minor adjustments due to post-workshop information received from HART. The following indicates adjustments made to the HART estimate; some adjustments were made to each risk profile. See Table 6 for a summary of PMOC/HART adjusted project costs by major SCC. The Adjusted Estimate represents the stripped project cost in \$YOE.

Table 6. PMOC Adjustments to HART Estimate \$YOE

Standard SCC codes		Base year Dollars		
		Grantee stripped estimate	Establish PMOC/HART Adjustments	Calculate Estimate
SCC	Category	Estimate w/o Contingency	Cost Adjustments	Adjusted Estimate
SCC 10	Guideway	1,200,018	13,337	1,213,355
10.04	Guideway: Aerial structure	1,090,289	11,384	1,101,673
10.08	Guideway: Retained cut or fill	7,455	147	7,601
10.09	Track: Direct fixation	95,867	1,710	97,577
10.11	Track: Ballasted	3,125	61	3,186
10.12	Track: Special (switches, turnouts)	3,283	35	3,317
SCC 20	Stations, Stops, Terminals, Intermodals	396,666	16,300	412,966
20.02	Aerial station, stop, shelter, mall, terminal, platform	273,163	16,300	289,463
SCC 30	Support Facilities: Yards, Shops and Admin Bldgs	125,546	2,378	127,924
30.02	Light Maintenance Facility	9,127	173	9,300
30.03	Heavy Maintenance Facility	47,186	894	48,080
30.04	Storage or Maintenance of Way Building	9,487	180	9,667
30.05	Yard and Yard Track	59,745	1,132	60,877
SCC 40	Sitework and Special Conditions	1,008,190	67,879	1,076,069
40.01	Demolition, Clearing, Earthwork	28,333	183	28,516
40.02	Site Utilities, Utility Relocation	310,517	1,658	312,176
40.04	Environmental mitigation, e.g. wetlands, historic/archeologic, parks	33,114	377	33,491
40.05	Site structures including retaining walls, sound walls	10,027	17,703	27,730
40.06	Pedestrian / bike access and accommodation, landscaping	42,548	5,715	48,263
40.07	Automobile, bus, van accessways including roads, parking lots	173,191	2,209	175,399
40.08	Temporary Facilities and other indirect costs during construction	409,288	40,034	449,322
SCC 50	Systems	258,115	3,427	261,542
50.01	Train control and signals	109,695	1,491	111,186
50.03	Traction power supply: substations	32,329	457	32,786
50.04	Traction power distribution: catenary and third rail	35,295	511	35,806
50.05	Communications	57,335	788	58,123
50.06	Fare collection system and equipment	9,610	131	9,741
50.07	Central Control	3,601	49	3,650
SCC 60	ROW, Land and existing improvements	197,720	7,443	205,163
60.01	Purchase or lease of real estate	179,361	6,830	186,191
60.02	Relocation of existing households and businesses	18,359	613	18,972
SCC 70	Vehicles	199,691	12,715	212,406
70.01	Light Rail	179,981	12,447	192,428
70.06	Non-revenue vehicles	13,581	185	13,765
70.07	Spare parts	6,129	83	6,213
SCC 80	Professional services and Agency costs	1,099,681	16,035	1,115,716
80.01	Preliminary Engineering	125,841	1,833	127,675
80.02	Final Design	211,663	1,126	212,789
80.03	Project Management for Design and Construction	363,135	5,878	369,012
80.04	Construction Administration & Management	161,908	12	161,920
80.05	Professional Liability and other Non-Construction Insurance	35,359	16	35,375
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	69,717	5,000	74,717
80.07	Surveys, Testing, Investigation, Inspection	65,253	1,503	66,757
80.08	Start up	66,804	667	67,471
SCC 10-80 total		4,485,627	139,514	4,625,141

The PMOC recommended an adjustment to the base cost estimate in the amount of \$139.5 million. Note that no latent contingency adjustments were made from any portion of HART’s estimate. Details of the adjustments are discussed Section 6.0 of this report.

7.5.3 Baseline Beta Values

For each risk profile, the starting point for the Beta values in this risk assessment were based on the Beta values imported from the prior, 2012 risk refresh and are shown by major SCC category in the tables below. These values are developed from FTA standards, adjusted in consideration of slight advancements in the stage of project and in consideration of the current level of estimate.

Table 7. Imported Beta Values for Risk Profile 1

SCC	R	D	M	C	Total Beta
SCC 10 - 50	0.00	0.00	0.00	0.38	1.43
SCC 60	0.00	0.25	0.40	0.25	1.95
SCC 70	0.00	0.50	0.10	0.30	1.95
SCC 80.01-08	Not applicable				
R = Requirements Risk D = Design Risk M = Market Risk					
C = Construction Risk Total Beta = 1 + (R + D + M + C)					

Table 8. Imported Beta Values for Risk Profile 2

SCC	R	D	M	C	Total Beta
SCC 10 - 50	0.00	0.25	0.25	0.45	2.20
SCC 60	0.00	0.40	0.80	0.25	2.40
SCC 70	Not applicable				
SCC 80.01-08	Not applicable				
R = Requirements Risk D = Design Risk M = Market Risk					
C = Construction Risk Total Beta = 1 + (R + D + M + C)					

Table 9. Imported Beta Values for Risk Profile 3

SCC	R	D	M	C	Total Beta
SCC 10-50	Not applicable				
SCC 70	Not applicable				
SCC 80.01	Not applicable				
SCC 80.02	0.00	0.14	0.14	0.21	1.54
SCC 80.03	0.00	0.17	0.06	0.40	1.68
SCC 80.04	0.00	0.24	0.31	0.35	1.95
SCC 80.05	0.00	0.08	0.05	0.25	1.43
SCC 80.06	0.00	0.19	0.11	0.39	1.74
SCC 80.07	0.00	0.19	0.23	0.47	1.94
SCC 80.08	0.00	0.42	0.25	0.60	2.32
R = Requirements Risk D = Design Risk M = Market Risk					
C = Construction Risk Total Beta = 1 + (R + D + M + C)					

Beta values for the current project were developed based on a refreshed view of the Scope, Cost, and Schedule risks identified in the project, informed by regular PMOC site visits and project reviews. The Beta values were refreshed from previous Beta assignments by the PMOC team and used for the refreshed final cost risk assessment. Note that the Beta value adjustments occurred independently for each Risk Profile as applicable. These Beta values were assigned as outlined in FTA guidance OP 40, and generally fall within ranges expected for this character of project. Beta values were applied at the second level SCC structure.

Table 10. Beta Values Risk Refresh

SCC	Description	Risk Profile 1	Risk Profile 2	Risk Profile 3
10	Guideway& Track Elements (Route Miles)			
10.04	Guideway: Aerial structure	1.33	2.05	-
10.08	Guideway: Retained cut or fill	1.33	-	-
10.09	Track: Direct fixation	1.33	2.05	-
10.11	Track: Ballasted	1.33	-	-
10.12	Track: Special (switches, turnouts)	-	2.05	-
20	Stations, Stops, Terminals, Intermodals			
20.01	At-grade station, stop, shelter, mall, terminal, platform	-	2.03	-
20.02	Aerial station, stop, shelter, mall, terminal, platform	-	2.03	-
20.06	Automobile parking multi-story structure	-	2.03	-
20.07	Elevators, escalators	1.33	-	-
30	Support Facilities: Yards, Shops, Admin. Bldgs.			
30.02	Light Maintenance Facility	1.33	-	-
30.03	Heavy Maintenance Facility	1.33	-	-
30.04	Storage or Maintenance of Way Building	1.33	-	-
30.05	Yard and Yard Track	1.33	-	-
40	Sitework& Special Conditions			
40.01	Demolition, Clearing, Earthwork	1.33	2.10	-
40.02	Site Utilities, Utility Relocation	1.33	2.10	-
40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	1.33	2.10	-
40.04	Environmental mitigation, e.g. wetlands, historic/archeological, parks	1.33	2.10	-
40.05	Site structures including retaining walls, sound walls	1.33	2.10	-
40.06	Pedestrian / bike access and accommodation, landscaping	1.33	2.10	-
40.07	Automobile, bus, van accessways including roads, parking lots	1.33	2.10	-
40.08	Temporary Facilities and other indirect costs during construction	1.33	-	-
50	Systems			
50.01	Train control and signals	1.33	-	-
50.02	Traffic signals and crossing protection	-	2.10	-
50.03	Traction power supply: substations	1.33	-	-
50.04	Traction power distribution: catenary and third rail	1.33	2.10	-
50.05	Communications	1.33	-	-
50.06	Fare collection system and equipment	1.33	-	-
50.07	Central Control	1.33	-	-
60	ROW, Land, Existing Improvements			
60.01	Purchase or lease of real estate	-	2.00	-
60.02	Relocation of existing households and businesses	1.95	2.00	-
70	Vehicles			
70.01	Light Rail	1.55	-	-
70.06	Non-revenue vehicles	1.95	-	-
70.07	Spare parts	1.55	-	-
80	Professional Services			
80.01	Preliminary Engineering	-	-	1.05
80.02	Final Design	-	-	1.25
80.03	Project Management for Design and Construction	-	-	1.35
80.04	Construction Administration & Management	-	-	1.45
80.05	Professional Liability and other Non-Construction Insurance	-	-	1.33
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	-	-	1.59
80.07	Surveys, Testing, Investigation, Inspection	-	-	1.72
80.08	Start up	-	-	2.32

7.5.4 Beta Value Adjustments

Significant issues noted in the scope, cost, and schedule reviews are reflected in the risk assessment model by means of adjustments to the risk Beta factors (β) applied to each SCC sub-category. These adjustments result in forecasts of ranges of cost for the project. Standard FTA Beta values incorporate an expectation of common risks that occur across transit projects; Beta adjustments below reflect those increases or decreases in risk that differ from risks occurring within standard Beta values.

The following sections present detail regarding the basis for adjustments, reflected previously in Table 6, beyond standard OP 40 Beta value suggestions. The purpose of this listing is to provide information regarding Beta values of note.

SCC Wide Beta Value Changes

System-wide Beta adjustments were made to two Risk Profiles: in Risk Profile 1, a reduction of 0.1 to the Construction Beta was made to recognize the refinement of change order estimates since the last review; and in Risk Profile 2, a Beta increase of 0.10 was made to the Market Beta in recognition of cost pressure due to a tightening of the construction market and a Beta increase of 0.10 was made to the Construction Betas due to concern that many multiple contractors will increase risk due to potential conflicts among the contractors.

SCC-Specific Beta Value Changes

The following issues determined the final resulting Beta values for the SCC sub-categories, which are the Beta values that reflect risk across all four categories of *Requirements, Design, Market, and Construction* risk, including the general Beta value increases previously noted in the section above. Noted below are only those conditions where exceptional changes to the standard Betas were noted. “Normal” risks associated with similar construction are accounted for in the base risk model.

SCC-70 – Vehicles (Risk Profile 1)

- Design Risk
 - 70.01 & 70.07 (β) = 1.55, decrease D to 0.10. Vehicle design work has advanced during the interim period since the last review.

SCC-10 – Guideway (Risk Profile 2)

- Design Risk
 - 10.04, 10.09, & 10.12 (β) = 2.10, decrease D to 0.10. Guideway plans have advanced to approximately the 90% level, and existing guideway work has provided the opportunity to resolve design unknowns.

SCC-20 – Stations, Stops (Risk Profile 2)

- Requirements and Design Risk
 - 20.01, 20.02, & 20.06 (β) = 2.30, increase R to 0.05 and decrease D to 0.30. Discussion continues with property owners that may result in design changes. At the same time, general design has advanced on the stations since the last review.

SCC-40 – Sitework and Special Conditions (Risk Profile 2)

- Design Risk
 - 40.01 – 40.07 (β) = 2.10, decrease D to 0.15. Advanced work in siting and resolving utilities and other site investigations brings more certainty to the design.

SCC-50 – System (Risk Profile 2)

- Requirements and Design Risk
 - 50.02 & 50.04 (β) = 2.10, decrease D to 0.15. Systems design has advanced since the last review.

SCC-60 – Right of Way (Risk Profile 2)

- Design and Market Risk
 - 60.01 & 60.02 (β) = 2.00, decrease D to 0.10 and M to 0.60. This Beta change recognizes that estimate adjustments were made that increase cost. The Beta adjustment here is for potential risk above the estimate adjustment that was made to the stripped estimate.

SCC-80 – Soft costs (Risk Profile 3)

- Design, Market, and Construction Risk: The following changes to the “soft cost” portions of the work all reflect the same reason. Since the last review, much work has been done to resolve staffing and professional services contract issues. Further, the detailed review of the project team staffing also resulted in an increase to the stripped estimate. Therefore, this adjustment recognizes the resulting reduction in risk since the last review.
 - 80.02 (β) = 1.25, decrease D to 0.05, M to 0.05, & C to 0.10
 - 80.03 (β) = 1.35, decrease D to 0.05, M to 0.05, & C to 0.20
 - 80.04 (β) = 1.45, decrease D to 0.10, M to 0.05, & C to 0.25
 - 80.06 (β) = 1.59, decrease D to 0.10 & M to 0.05
 - 80.07 (β) = 1.25, decrease D to 0.19, M to 0.23, & C to 0.25

7.5.5 Cost Risk Analysis

This section presents the PMOC’s analysis of the model-based Project Cost Risk Assessment based on the FTA Risk and Contingency Review Workbook (version 4.0), utilizing the project-adjusted BRFs. This workbook is based on the summary organizational structure of the FTA SCC 10 through 80 for the capital cost elements of a project. SCC 90 (contingency) is specifically excluded as a duplicate measure of risk. Risk for SCC 100 (finance charges) is not covered in the standard FTA risk range factors. Project-level risk is an aggregated amount of the risk associated with all of the SCC Ranges.

Using the Beta values in Table 10, a simulation project risk model was developed, as presented later in this report. Table 11 presents the corresponding numeric data results from the risk model.

Table 11. Risk Model Data

YOE Grantee values	Overall	Part 1	Part 2	Part 3
Grantee total estimate/budget (SCC 10-90)	4,948,635	1,804,664	1,943,586	1,200,385
Grantee exposed contingency	463,008	21,784	340,520	100,704
Grantee stripped estimate/budget (SCC 10-80)	4,485,627	1,782,879	1,603,067	1,099,681
YOE PMOC values				
Latent contingency	0	0	0	0
Inflation Adjustment	0	0	0	0
Adjustments	139,514	73,843	49,637	16,035
Adjusted estimate	4,625,141	1,856,722	1,652,703	1,115,716
Model recommendations				
Recommended estimate/budget, incl. contingency	5,213,963	1,989,386	2,018,486	1,206,092
Contingency recommendation amount	588,822	132,664	365,782	90,376
Contingency %	13%	7%	22%	8%
Secondary mitigation target	5,409,551	2,033,453	2,139,987	1,236,112
Secondary mitigation recommended amount	195,588	44,067	121,501	30,020
Secondary mitigation %	4%	2%	7%	3%
Risk analysis				
Lower bound (~0%)	4,625,141	1,856,722	1,652,703	1,115,716
Lower range reporting amount (40%)	5,100,833	1,963,897	1,948,208	1,188,728
Contingency target (Conditioned estimate) (50%)	5,213,963	1,989,386	2,018,486	1,206,092
Upper range reporting amount (80%)	5,670,230	2,092,185	2,301,923	1,276,122
Upper bound (~100%)	7,586,212	2,523,863	3,492,151	1,570,199

Further analysis of these amounts is provided in other sections below.

7.5.6 Cost Contingency

The PMOC identified YOE \$463 million in allocated and unallocated contingency, and found no additional latent contingency. This amount is reflected in Table 12. Further, with known estimate adjustments, that contingency is likely to be currently reduced to \$323.5 million.

Table 12. PMOC Recommended Contingency

YOE Grantee values	Overall	Part 1	Part 2	Part 3
Grantee total estimate/budget (SCC 10-90)	4,948,635	1,804,664	1,943,586	1,200,385
Grantee exposed contingency	463,008	21,784	340,520	100,704
Grantee stripped estimate/budget (SCC 10-80)	4,485,627	1,782,879	1,603,067	1,099,681
YOE PMOC values				
Latent contingency	0	0	0	0
Inflation Adjustment	0	0	0	0
Adjustments	139,514	73,843	49,637	16,035
Adjusted estimate	4,625,141	1,856,722	1,652,703	1,115,716
Model recommendations				
Recommended estimate/budget, incl. contingency	5,213,963	1,989,386	2,018,486	1,206,092
Contingency recommendation amount	588,822	132,664	365,782	90,376
Contingency %	13%	7%	22%	8%
Secondary mitigation target	5,409,551	2,033,453	2,139,987	1,236,112
Secondary mitigation recommended amount	195,588	44,067	121,501	30,020
Secondary mitigation %	4%	2%	7%	3%
Risk analysis				
Lower bound (~0%)	4,625,141	1,856,722	1,652,703	1,115,716
Lower range reporting amount (40%)	5,100,833	1,963,897	1,948,208	1,188,728
Contingency target (Conditioned estimate) (50%)	5,213,963	1,989,386	2,018,486	1,206,092
Upper range reporting amount (80%)	5,670,230	2,092,185	2,301,923	1,276,122
Upper bound (~100%)	7,586,212	2,523,863	3,492,151	1,570,199

The PMOC prepared a risk assessment by Risk Profile as previously described. At this refresh, the PMOC recommends approximately 7% contingency for the Risk Profile 1 (contracted direct cost), 22% for the Risk Profile 2 (uncontracted direct cost), and 8% contingency for the Risk

Profile 3 (soft costs), equating to an overall contingency recommendation of \$588.8 million (or ~13%).

7.6 Schedule Risk Assessment

7.6.1 Methodology

The Schedule Risk Assessment is based on the Master Project Schedule with a Data Date of February 28, 2014. As noted in the following discussion, the PMOC conditioned the MPS for use in the risk assessment.

This review focuses on the elements of *schedule* uncertainty associated with the effectiveness and efficiency of HART’s project implementation, the project scope, and surrounding project conditions.

The OP 40 schedule analysis output data are generated from Oracle’s “*Pertmaster Risk Analysis*” software program used by the PMOC. The PMOC risk analysis process conforms to the software user manual and intent of the OP 40 as described below:

There are two kinds of project risk:

- **Uncertainty risks** are inherent variability that makes it impossible to predict exactly how long an activity will take. For instance, you can estimate how long it will take within a range of uncertainty, but you can never predict exactly how long.
- **Risk events** are events separate from an activity that can disrupt or otherwise impact the activity.

Pertmaster handles risk events by using a Risk Register to enter potential risk events and estimates of the probability and impact of the risks on activity duration, costs, and project quality. Once uncertainty and risk event impact estimates have been entered for all tasks within a project, Pertmaster performs a high number of project simulations using “Monte Carlo” or “Latin Hypercube” sampling of the estimates to select random task duration and cost values for every run-through of the simulation. These simulations generate a range of outcomes that can be used to predict project duration and costs with statistical confidence.

The Critical Path Method (CPM) is the traditional means for determining a project finish date. However, because CPM only determines a single date and does not consider potential risks, results are not always comprehensively reliable. Risk Analysis uses risk inputs to determine a range of project finish dates with more confidence and reliability. The Pertmaster risk analysis is based on the risk management process outlines in Chapter 11 of the Project Management Institute’s “*A Guide to the Project Management Body of Knowledge*” and consists of the components shown below. The process is not strictly linear; there may be considerable repetition of certain steps before moving on.

Schedule Review

The purpose of the Schedule Review “Characterization” is to check HART’s project schedule, referred to as the Current Probable Schedule (CPS) for logic errors, open-ended tasks, negative lags, start-to-finish links, and other potential problems that could compromise the risk analysis.

This step ensures the integrity of the schedule and improves the chances for a meaningful analysis. If mechanical or fundamental revisions are necessary based upon the schedule characterization, the risk management team makes the necessary adjustments and creates a revised schedule file, called the Adjusted Project Schedule (APS).

Pre-Analysis Check

A rudimentary analysis of the schedule is performed to identify activities that drive project duration and costs. These activities merit the closest attention during subsequent detailed risk analysis.

Build a Risk Model

Estimates for duration, cost, and resource uncertainty for each project task are identified by a specific team of experts relying on industry statistics and experience. The estimate uncertainty duration ranges are incorporated into a copy of the project schedule called the Estimate Uncertainty Model (EUM).

The team then brainstorms a list of potential risk events, evaluates the risk events as to how likely it is that they may occur and the potential impact such occurrences may have. The list of risk events is then entered into a risk register and each risk event is assigned a probability and impact, resulting in a risk degree factor, which is scored by the risk modeling software. At this point, a copy of the EUM is made, to which Pertmaster then applies the uncertainty and maps the risk events to the appropriate tasks to build a risk model, called an Impacted Risk Model (IRM).

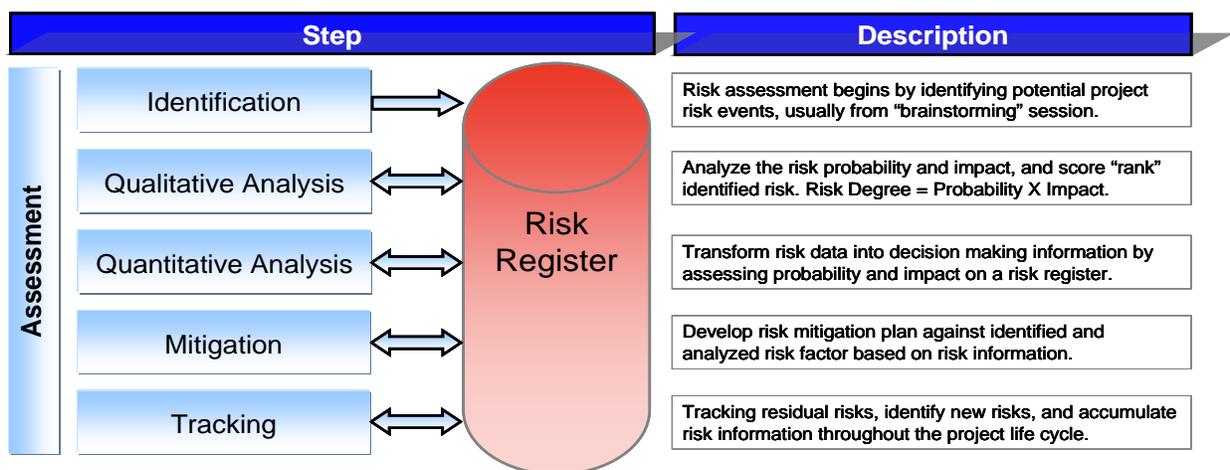
Analyze and Review

A “Monte Carlo” or “Latin Hypercube” sampling analysis is run on the IRM. The risk analysis output can be viewed and evaluated in a wide variety of reports. The review options allow the risk management team to focus on areas of the schedule that pose the greatest risk to the overall program. This helps with the creation of an efficient and cost-effective risk mitigation plan.

Mitigate and Report

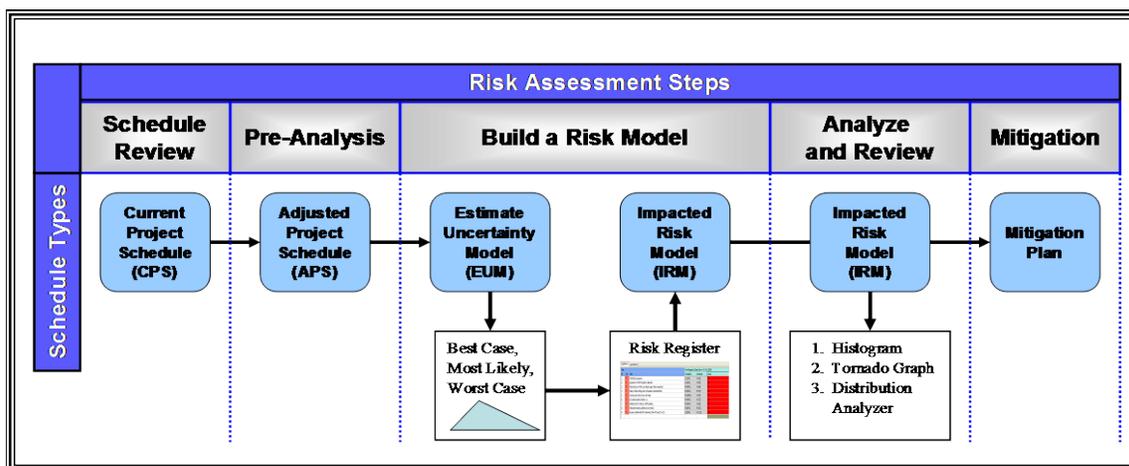
Based on the preliminary analysis, the risk management team reviews and evaluates alternative scenarios with varying reductions to duration, resource and cost uncertainty. Ultimately, the most cost-effective risk mitigation strategy is chosen and formalized into a risk mitigation plan.

Figure 3. Schedule Risk Assessment Process



The figure below describes the various schedules that are created once the PMOC commences the OP 34 review of HART’s project schedule, called the CPS. The final product is the IRM, which the PMOC uses for the risk analysis in Pertmaster.

Figure 4. Schedule Risk Assessment Steps and Schedule Types



7.6.2 Schedule Risk Analysis

Project Schedule Review

The PMOC used HART’s project schedule file “*FEB 2014 Update - Risk Refresh-04-02-14.xer*” (CPS) to conduct the Schedule Review. The PMOC concentrated its efforts on ensuring that a detailed, mechanical and fundamentally sound schedule was used for both the risk assessment and the contingency analysis. HART and the PMOC collaboratively worked through initial master program schedule development to ensure adequate detail and logic to support the PMOC risk analysis.

The PMOC made a backup copy of the CPS electronic file and made several logic adjustments to

account for poor or missing logic ties and increased some activity detail to better represent the network logic in order to produce a more realistic risk analysis model. The PMOC used the “adjusted” project schedule, herein referred to as the “Adjusted Project Schedule” (APS), to provide more realistic risk assessment and contingency analysis output. The APS is considered most optimistic, as it is stripped of all latent and patent time contingency.

The HART Basis of Schedule stated that all activities in the MPS contained a 4% contingency. Most activities in the MPS utilize a 7-day per week calendar that does not contain non-work periods for weekends or holidays. The PMOC has continually recommended HART use multiple calendars to more accurately represent and distinguish non-work periods. HART stated that it is having difficulty persuading the construction contractors to change their standard work calendar library from 7 days to 5 days.

The PMOC reduced original durations on some longest critical path activities as a means to strip the embedded 4% contingency purported by HART.

The risk analysis adjusts the activity duration distribution ranges in order to establish a reliable and supportable risk analysis calculation, primarily for determining the project completion date.

A summary of the PMOC adjustments are listed below:

- Deleted (stripped) all activities containing “buffer float”
- Minor logic changes were made for activities containing excessive float
- Some longest critical path original durations were shorted to account for built-on time contingency.

Pre-Analysis Check

The PMOC performed a pre-analysis check by applying a quick risk distribution range across all schedule activities and reviewing the confidence level range, duration sensitivity, and criticality index. Preliminary notes and observations were made for specific schedule drivers. Note that the pre-analysis check is performed as a pre-impacted risk analysis, meaning that the schedule does not have risk events incorporated at this point of the risk analysis process.

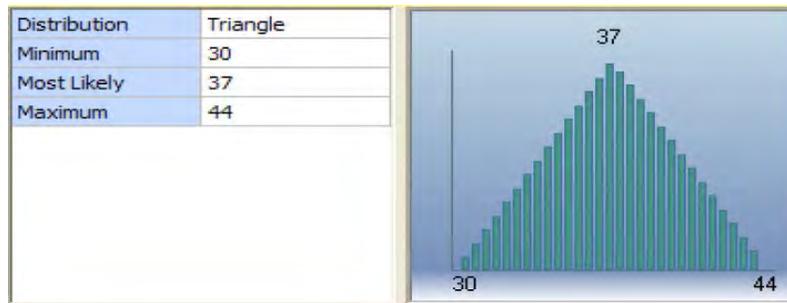
Build a Risk Model “Impacted Risk Plan”

(1) Estimate Uncertainty Model (EUM)

Before running the risk analysis, the PMOC assigned three durations to each activity in the schedule. The three durations for each activity represent best case “minimum”, most likely, and worst case “maximum”. The PMOC reviewed the activity Original Durations (OD) in the CPS and made an objective determination of the adequacy of each OD. The PMOC used most of the schedule OD durations as the most-likely durations and, in some cases, the PMOC determined that certain activity ODs were overly optimistic. Most of the “maximum” durations the PMOC assigned are 25-30% greater than their ODs, depending on the work task, project phase and task location. Also, some final design and FFGA related activities containing a one-day duration were assigned a worst-case duration of 3 days, or 300% of the original duration. The best-case durations were calculated as 95% of the OD, or “- 5%”. This value is low because the EUM is already based on a stripped and “best case” schedule. The value ranges (differences in activity

durations) reflect levels of uncertainty. Based on the three durations, a triangular distribution was assigned to each activity.

Figure 5. Duration Distribution Type



Once the estimate uncertainty process step is complete, the EUM is used to develop the Impacted Risk Model (IRM).

(2) Impacted Risk Model (IRM)

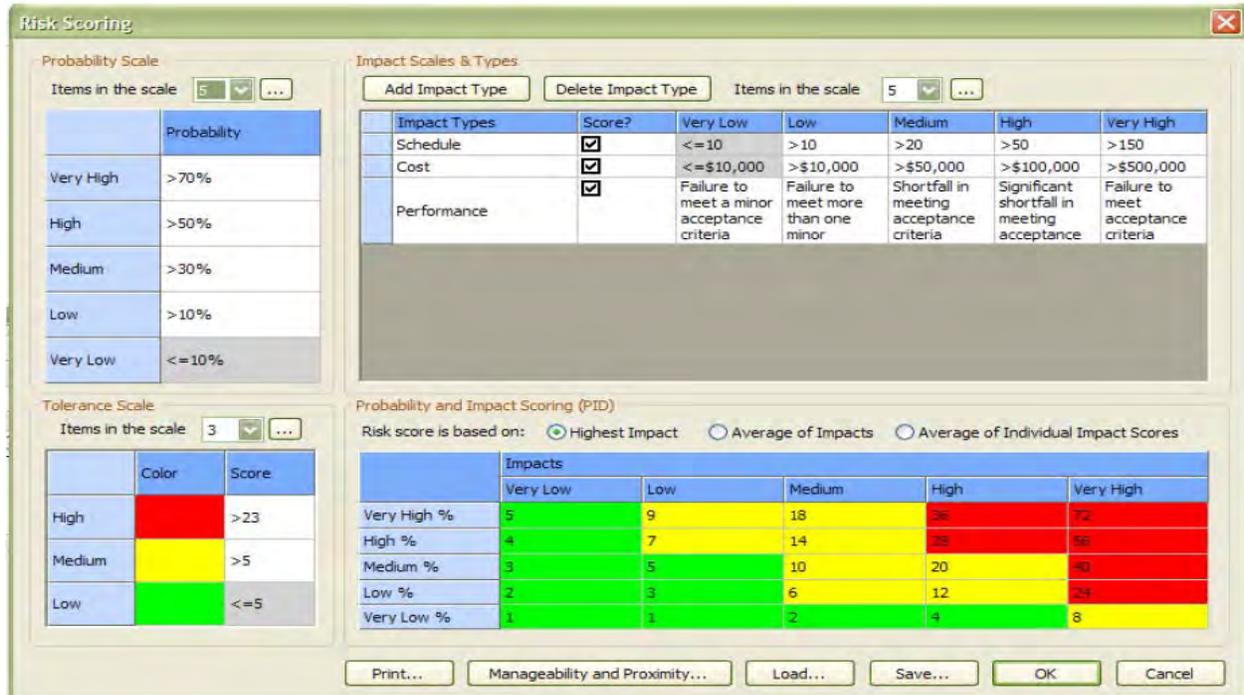
The PMOC conducted a review and evaluation of all risks in the HART Project risk register and the PMOC risk register in order to decide which risk events should be used for the schedule risk analysis (Pertmaster). Once the risks were culled and prioritized, the PMOC assigned the risks events into the longest critical path and into the respective project alignment sections, WOFH/ Kamehameha, Airport and City Center, and the MSF.

Risk events (ID numbers) are used in the risk register to build the risk plan. Many of the risk events are tied to the Airport and City Center section alignment since they are located near downtown and inherently contain more uncertainty than the more westerly, non-critical alignment sections that do not do adversely affect the risk analysis. The PMOC risk events used to perform the Risk Analysis are listed below:

- ROW acquisition delay (Airport/ City Center)
- Utility issues & delays (Airport/ City Center)
- Bidding delays, protests, rebidding required (Airport/ City Center)
- Traffic management and congestion delays (Airport/ City Center)
- Labor Availability Challenges (Airport/ City Center)
- Encounter delays with core systems automation (Airport/ City Center)
- Vehicle manufacturing delivery, startup, testing challenges (Airport/ City Center)

Each risk event was scored based on a risk degree factor. The risk degree factor is calculated by the risk event probability and impact factors. The probability and impact factors for each risk event are objectively determined by the PMOC risk management team. The risk register scoring system prioritizes each risk event by the risk degree factor, see figure below.

Figure 6. Schedule Risk Scoring Chart



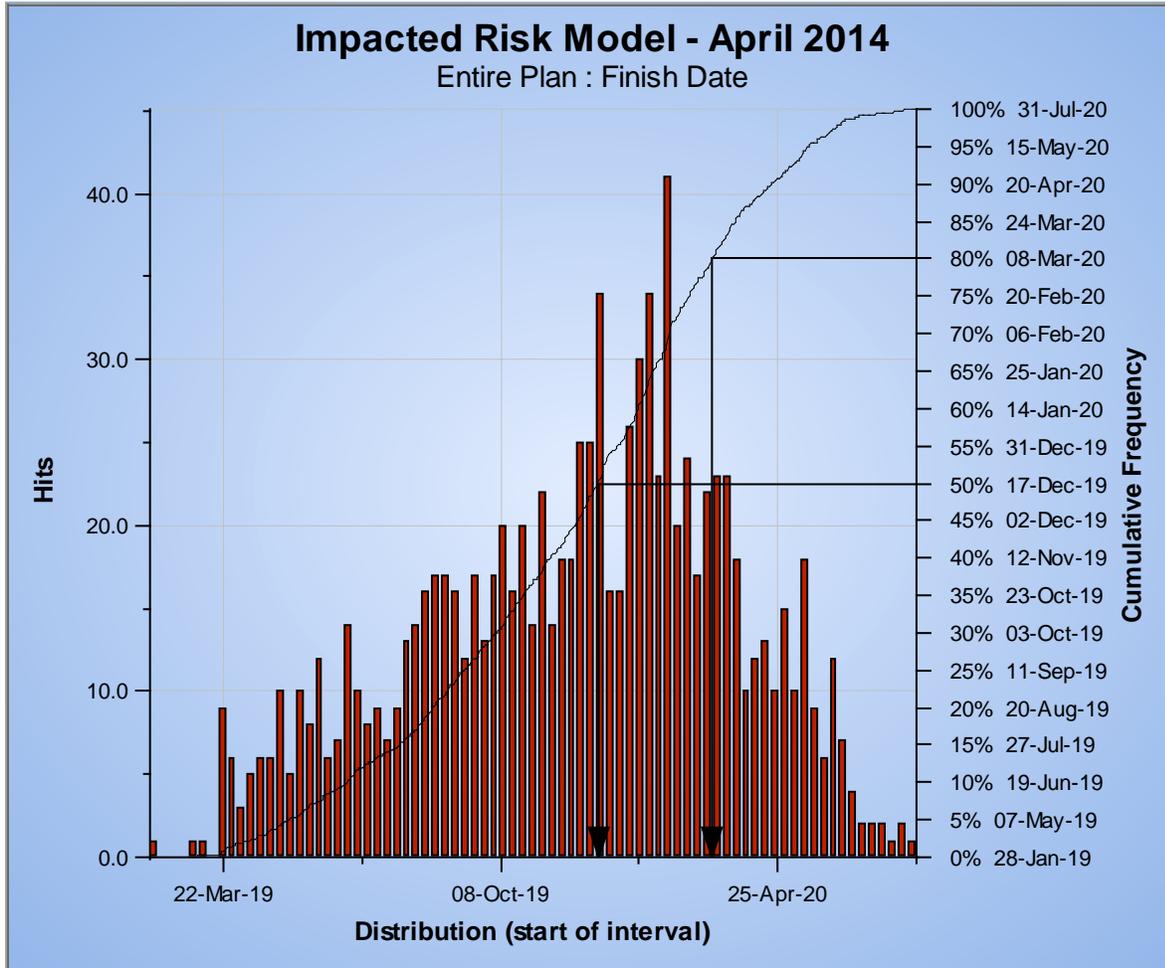
Once the risk events and their risk degree factors are determined, they are incorporated into a copy of the PMOC EUM, resulting in a plan file called the IRM. The IRM is used to produce all of the schedule analysis “output” reports.

Analyze and Review

(1) Summary Results

The PMOC generated a confidence level histogram. The IRM schedule model calculated 1,000 simulations, selecting random durations for each task, to estimate the project completion date within a confidence range. This analysis yields the results shown in the figure below.

Figure 7. Project Completion Date Confidence Level



The IRM distribution range for project completion ranges from the 0% to 100% confidence levels span a 549-day period. The probability percentage points for the IRM are:

- 20% Confidence level completion date: 20-Aug-19
- 50% Confidence level completion date: 17-Dec-19
- 75% Confidence level completion date: 20-Feb-20
- 90% Confidence level completion date : 20-Apr-20
- 100% Confidence level completion date: 31-Jul-20

The risk event results are produced by running a schedule analysis using the IRM which contains qualitative risk events within the software risk register. The true indication of how sensitive each risk event ultimately becomes is not realized until the analysis is performed. For example, a risk event with a very high score does not necessarily mean that it will be highly sensitive to the schedule, as it may only affect non-critical activities containing total float. The schedule drivers that contain the most impact potential contain a high-risk degree and are on the longest critical path or near critical path.

7.6.3 Schedule Contingency

Adjusted Project Schedule (APS)

The APS was used for both the schedule risk assessment and the Contingency Analysis Review. The APS is a backup copy of HART’s Master Project Schedule (MPS) with adjustments made to logic, calendars and incorporation of additional activities to better reflect a logical critical path and alleviate excessive float in certain other logic paths. The APS is also stripped of all patent and latent contingency. Because the APS is pre-analysis, not containing estimate uncertainty or risk events, it is considered most optimistic, as it is stripped of all latent and patent time contingency.

Contingency Analysis

The objective of the contingency analysis, pursuant to OP40, is to estimate the minimum amount of schedule contingency required to complete the project on schedule. The FTA guidance states that the contingency recommendations shall be developed using the following assumptions:

- At the Revenue Service Date, schedule contingency requirements have been reduced to a minimum requirement or possibly eliminated.
- At the point of 100% complete with bid, the project should have sufficient schedule contingency available to absorb a schedule delay equivalent to 20% of the duration from Entry into Final Design through Revenue Operations.

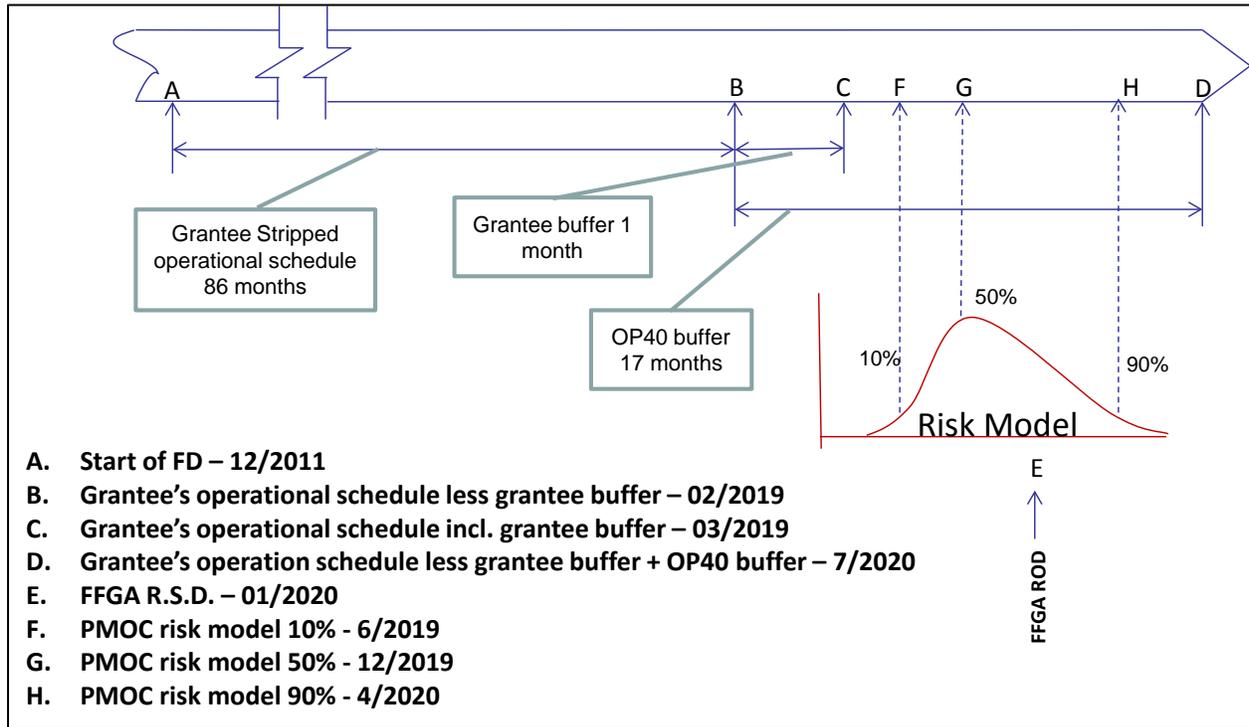
The APS indicates an 86.2-month duration from the start of the APS Final Design through RSD. According to the OP40, the project should contain the equivalent of 20% of this duration as contingency. The result is a contingency buffer total of 17.2 months. The result of adding 17.2 months contingency to the APS RSD (07-Feb-19) is 13-Jul-20 as shown in the table below. The OP 40 buffer float calculation results in an RSD of July 13, 2020, approximately five and a half months beyond the FFGA RSD of January 31, 2020.

Table 13. Schedule Contingency Final Design through RSD

Entry to Final Design	APS RSD	Duration			20% Float Duration			APS RSD 20% Float added to RSD	CPS RSD Date	Additional Float Required (Variance)		
		Dys	Mth	Yrs	Day	Mth	Yrs			Dys	Mth	Yrs
29-Dec-11	07-Feb-19	2,606	86.2	7.1	521	17.2	1.4	13-Jul-20	31-Jan-20	163	5.4	.45

The figure below illustrates the same information relative to the PMOC Schedule Risk Analysis IRM dates plotted for the 10, 50 and 90th percentiles represented by letters F, G and H, respectively. The OP40 calculation for buffer float indicates a July 13, 2020 RSD, five and a half months beyond the FFGA RSD date of 31-Jan-20. The FFGA RSD milestone date of 31-Jan-202 falls within the PMOC IRM 60 - 65 percentile. The last risk PMOC assessment conducted in July 2012 indicated an 85 – 90 percentile range for the FFGA 31-Jan-20 date.

Figure 8. Buffer Float and RSD Analysis



7.7 Risk Mitigation

7.7.1 Primary Mitigation

HART developed a risk register with its identification of project risks. Development of a formal Risk and Contingency Management Plan (RCMP) as an integral part of HART’s Project Management Plan is expected, including establishment within HART’s organization of authority to ensure that the RCMP is well-managed. An acceptable RCMP was submitted on September 27, 2011. Updated versions dated June 29, 2012 and November 1, 2013 were provided to the PMOC later. Primary mitigation is comprised of the management actions defined within the RCMP that will occur to reduce or eliminate current or future identified risks.

7.7.2 Secondary Mitigation

Secondary mitigation consists of pre-planned potential scope or process changes that may be triggered when risk events occur that cause overruns that cannot be resolved by available project contingency. Example events that may incur secondary mitigation include right of way costs that are significantly over the estimate or unexpected geotechnical hazards that are encountered, etc., such that the change is likely to cause a significant over-budget condition and reduction of contingency for future work. Such “triggered” mitigation would enable HART to make cost reductions in a planned and orderly process and preserve contingencies for use later in the project. It is noted that Secondary Mitigation is not to be confused with a value engineering

exercise. Value engineering is a formal, systematic, multi-disciplined process designed to optimize the value of each dollar spent.

Table 14 utilizes model information to estimate required amounts of secondary contingency. The overall secondary mitigation recommendation of \$195 million took into consideration all three Risk Profile portions of the project:

- Risk Profile 1 and 2 include \$165.5 million in Secondary Mitigation and represent the direct cost portions of the project.
- Risk Profile 3 includes \$30 million in Secondary Mitigation and represents the “soft costs” portion of the project.

It is well-recognized that secondary mitigation is difficult to cost-effectively obtain at this stage of design and where portions of the project are already contracted for construction. However, station design continues and may be a source for secondary mitigation, as may other areas of the project.

In its most current RCMP, HART provides a list of potential Secondary Mitigation items whose total value is estimated at \$152 million. The nature of these estimates implies that the degree of estimate to develop these values is rather subjective and therefore caution should be applied to relying on the estimated value. However, the general lack of detailed design or estimating for the Secondary Mitigation items precludes strong reliance on the value of the proposed Secondary Mitigation.

Table 14. PMOC Recommended Secondary Mitigation

YOE Grantee values	Overall	Part 1	Part 2	Part 3
Grantee total estimate/budget (SCC 10-90)	4,948,635	1,804,664	1,943,586	1,200,385
Grantee exposed contingency	463,008	21,784	340,520	100,704
Grantee stripped estimate/budget (SCC 10-80)	4,485,627	1,782,879	1,603,067	1,099,681
YOE PMOC values				
Latent contingency	0	0	0	0
Inflation Adjustment	0	0	0	0
Adjustments	139,514	73,843	49,637	16,035
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Model recommendations				
Recommended estimate/budget, incl. contingency	5,213,963	1,989,386	2,018,486	1,206,092
Contingency recommendation amount	588,822	132,664	365,782	90,376
Contingency %	13%	7%	22%	8%
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Secondary mitigation recommended amount	195,588	44,067	121,501	30,020
Secondary mitigation %	4%	2%	7%	3%
Risk analysis				
Lower bound (~0%)	4,625,141	1,856,722	1,652,703	1,115,716
Lower range reporting amount (40%)	5,100,833	1,963,897	1,948,208	1,188,728
Contingency target (Conditioned estimate) (50%)	5,213,963	1,989,386	2,018,486	1,206,092
Upper range reporting amount (80%)	5,670,230	2,092,185	2,301,923	1,276,122
Upper bound (~100%)	7,586,212	2,523,863	3,492,151	1,570,199

7.8 Conclusion

7.8.1 Cost Risk Analysis

During the April 2014 risk workshop, information was provided indicating that HART was aware of additional costs that should be included, and which were added by the PMOC as

estimate adjustments, along with PMOC’s independent estimate adjustments. The PMOC has prepared this risk refresh based upon additional information provided by HART after the workshop. The PMOC found that HART’s risk identification effort, including its risk mitigation activities, generally conforms to its documented processes.

The PMOC separated the project into three distinct risk profiles to better model the effect of risk upon the project. The cost risk assessment recognized general reductions in risk due to advancement of design. However, little additional construction has occurred and so no major changes in construction risk were made. Further, the project delay has caused the bidding effort to occur during an increase in the construction market, which adds market risk to the model. A major influence in the risk for Risk Profile 2 is market risk due to an increasingly strong construction market both at the project location and on the west coast of the U.S.

It is recognized that efforts have been made to recover contingency levels through cost reduction measures, value engineering, and revised project delivery strategies. However, these types of changes are becoming increasingly less likely.

The PMOC basis of the stripped, adjusted estimate for cost risk modeling is as follows:

Project Budget	\$5,122
HART Current Available Contingency	\$463
Financing	\$173
Net Stripped Estimate	\$4,486
PMOC Adjustments	\$139.5
Net Stripped, Adjusted Estimate	\$4,625

With adjustments of \$139.5 million, the current contingency is reduced to \$323.5 million (7% of the adjusted, stripped estimate). This level of contingency would be commensurate with a project that is completely bid and has progressed in construction beyond the point of being “in the ground”. Considering the project progress to date is 22%, this current level of contingency would only reflect an approximate achievable probability of 42%.

The predicted FTA model outcome is \$5,214 million (excluding finance costs). This includes \$588 million in recommended contingency (13% of the adjusted, stripped estimate). HART’s estimate falls short of the predicted FTA model outcome by \$265 million (\$139.5 million in recommended adjustments plus \$125.5 million in additional recommended contingency). There is a 5.4% difference between HART’s project estimate of \$4,949 million and the predicted FTA model outcome of \$5,214 million.

The recommended estimate represents the median value from the FTA risk assessment model, when adjusted for the specifics of this project. The historic trend indicates 40%-likely to 80%-likely range of \$5,101 million to \$5,670 million.

The RCMP includes several potential Secondary Mitigation options. However, there is a general lack of detailed development of plans and cost estimates for the items identified in the RCMP.

Recommendations

- (1) HART’s estimate falls short of the predicted FTA model outcome by \$265 million (\$139.5 million in recommended adjustments plus \$125.5 million in additional recommended contingency). HART should review its project estimate and determine how to reduce costs to close this gap.
- (2) The PMOC-recommended amount of secondary mitigation is \$195.5 million.
- (3) The RCMP must be updated to strengthen risk contingency tracking, custody, and reporting. The RCMP should include an updated contingency draw-down curve that reflects the current contingency balance and more accurate drawdown milestones. Diligence and vigilance must continue to be applied to this effort to avoid a rapid contingency usage that could ultimately leave the project unprotected.
- (4) HART should update and continue its tracking of the Secondary Mitigation items, and develop a process by which those items may be priced by the bidders of the remaining work at the time of bidding. This strategy avoids attempting to trigger Secondary Mitigation after receipt of bids or after contracting, at which point the cost reduction may be significantly reduced due to lack of competitive forces.
- (5) Strong controls must be put in place immediately to avoid future rapid contingency reduction. The frequency and the levels of project management to which these statistics are reported should be improved and monitored monthly.
- (6) The PMOC and HART should engage in a focused “cost containment workshop” on a monthly basis to monitor the efforts taken to avoid rapid contingency usage.

7.8.2 Schedule Risk Analysis

HART’s target Revenue Service Date is March 2019. The FFGA Date is January 31, 2020. The Impacted Risk Model (IRM) distribution range for project completion from the 0% to 100% confidence levels span a 549-day period. The probability percentage points for the IRM are:

- 20% Confidence level completion date: 20-Aug-19
- 50% Confidence level completion date: 17-Dec-19
- 75% Confidence level completion date: 20-Feb-20
- 90% Confidence level completion date : 20-Apr-20
- 100% Confidence level completion date: 31-Jul-20

The probability confidence level for achieving project completion by January 2020, the FFGA RSD, has been reduced by 15-20% since the last Risk Assessment refresh in July 2012. The Schedule Risk Analysis indicates 66-70% probability of completing the project by the FFGA RSD of 31-Jan-20. The schedule risk analyses using the OP40 calculation indicates a recommended RSD of July 13, 2020.

The FFGA RSD of January 2020 can be achieved; however, HART must implement strong schedule and contract management throughout the remainder of the project.

Recommendations

- (1) HART should closely monitor the MPS longest critical path and near critical

paths as a means to prevent depletion of project total float to achieve RSD by January 2020.

- (2) HART should revise its staffing plan to ensure that schedule compression has not caused excessive staff requirements during peak demand during construction.
- (3) The PMOC and HART should engage in focused “schedule containment workshops” on a monthly basis to monitor the efforts taken to achieve the FFGA RSD.

8.0 APPENDICES

Appendix A: List of Acronyms

AHJV	▪ Ansaldo Honolulu Joint Venture
AIS	▪ Archaeological Inventory Survey
APS	▪ Adjusted Project Schedule
BCE	▪ Base Cost Estimate
BOE	▪ Basis of Estimates
BRF	▪ Beta Range Factor
CCO	▪ Contract Change Orders
CPM	▪ Critical Path Method
CPS	▪ Current Probable Schedule
CSC	▪ Core Systems Contract
DB	▪ Design-Build
DBB	▪ Design-Bid-Build
DBOM	▪ Design-Build-Operate-Maintain
DTS	▪ Department of Transportation Services
EUM	▪ Estimate Uncertainty Model
FFGA	▪ Full Funding Grant Agreement
FTA	▪ Federal Transit Administration
GET	▪ General Excise Tax
HART	▪ Honolulu Authority for Rapid Transportation
IRM	▪ Impacted Risk Model
KHG	▪ Kamehameha Highway Guideway
MPS	▪ Master Project Schedule
MSF	▪ Maintenance and Storage Facility
OD	▪ Original Duration
OP	▪ Oversight Procedure
PMOC	▪ Project Management Oversight Contractor
PMP	▪ Project Management Plan
RCMP	▪ Risk and Contingency Management Plan
ROD	▪ Record of Decision
ROW	▪ Right-of-Way
RSD	▪ Revenue Service Date
SCC	▪ Standard Cost Category
TCC	▪ Technical Capacity and Capability
WOFH	▪ West Oahu/Farrington Highway
YOE	▪ Year of Expenditure



HONOLULU AUTHORITY for RAPID TRANSPORTATION

Honolulu Rail Transit Project (H RTP)

**Response to PMOC April 2014 Risk Refresh Workshop
Report Dated July 2014 (Final)**

**Submitted to: Federal Transit Administration
September 10, 2014**

Submitted by: Honolulu Authority for Rapid Transportation (HART)



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Honolulu Rail Transit Project (H RTP) Response to PMOC Report 2014 Risk Refresh of July 2014

1.0 INTRODUCTION

The Honolulu Authority for Rapid Transportation (HART) has successfully overcome significant obstacles and made steady progress, advancing the project in a way that enhances transparency, efficiency, effectiveness, quality and safety. As of today, the project remains on schedule and on budget. Contingency funds are closely monitored to ensure we stay on budget. HART has taken proactive management actions to recover time lost due to legal delays, and mitigate contingency fund losses that also resulted from these delays. Nevertheless, these delays have had serious adverse cost consequences and compressed the project schedule by more than a year. Finally, current market conditions challenge both budget and schedule and are affecting construction cost estimates for the remaining 35 percent of project bids.

The Honolulu Rail Transit Project (Project) has, thus far in its development, weathered several significant challenges including two lawsuits that resulted in construction and property acquisition delays. While HART prevailed in the federal lawsuit six months ago and has fully complied with the Hawaii Supreme Court ruling of August 2012, the legal challenges have had a cascading effect on the project in several areas. As the FTA noted, the legal challenges that resulted in a temporary hold on construction and property acquisition has compressed our construction schedule. Compression has resulted in the need to perform the work in a much shorter timeframe, which will require additional manpower and equipment. The construction market has also shifted considerably, becoming more active in Honolulu during this period and resulting in higher bids than originally projected. All of these challenges have some level of cost and schedule risks associated to them. Some of these cost and schedule impacts have been quantified and others have yet to be fully market-tested.

The Risk Refresh, as noted in FTA's transmittal letter to HART, is a planning tool designed to prepare for potential issues that may impact the project's implementation within the context of surrounding conditions. HART believes that developing proper mitigation plans in advance of possible adverse scenarios better positions the agency to respond effectively and efficiently to a variety of risk scenarios. Even though these scenarios may not occur, HART is preparing to meet the potential challenges of these risks in our planning and management.

HART is committed to doing everything in its power to deliver the Project on time and within budget. To deliver on that promise HART has taken action to manage costs and drafted an aggressive schedule, while making improvements to the Project to ensure the agency delivers a safe, efficient and high-quality transit system.

HART made several key decisions regarding the scope of the Project since the signing of the Full Funding Grant Agreement in December of 2012. These scope refinements enhanced the overall safety and effectiveness of the rail transit system for future passengers. These refinements included: passenger platform safety gates at each station; adding seats to transit vehicles to enhance passenger comfort; adjusting the vehicle consist from a 2-car train to a 4-car train in

the opening year to address overcrowding concerns from seniors and the disabled community; and fully automating the Maintenance & Storage Facility (MSF) yard to enhance yard safety and reduce long-term operating costs. Each of these items was directly related to the improvement of safety, operational efficiency and passenger comfort. With roughly 65 percent of contracts issued and the design nearly 78 percent complete, the scope of the Project has now solidified so that the risk of change to the Project’s scope definition is relatively low moving forward.

Since the April 2014 Risk Refresh workshop, significant progress has been made to manage the risks and uncertainties associated with a project of this size and scope. HART has hired key staff to enhance construction oversight; developed proactive schedule and interface strategies; resolved third-party agreements to ensure our schedule remains on track; developed industry outreach to promote fair and healthy competition for project work; and evaluated and refined procurement strategies to strengthen our market position. (See Table 1).

HART continues to aggressively manage the Project, particularly its scope, schedule and budget. Mitigating risks where possible is part of that strategic management plan. Conducting this Risk Refresh in partnership with the FTA and the PMOC reflects a productive and proactive process that further enhances HART’s ability to deliver the safe, reliable and high-quality transit system outlined in our Full Funding Grant Agreement.

Table 1 - Measures Taken to Manage Risk and Uncertainty

Area of Risk Management	Type of Action	Description
Technical Capability & Capacity	Roles & Responsibilities	Added specialized staff and clarifying organizational lines of responsibility to streamline decision-making and enhance efficiency
Technical Capability & Capacity	Change Management	Conducted an in-depth analysis of the Change Management process, including examining best practices from other transit agencies, to further streamline the process
Safety	MSF Automated Yard	Settled a significant cost and schedule change to the MSF for implementation of a fully automated train control system to improve yard safety and operational efficiency
Third-Party Agreements	Right-of-Way Acquisition (ROW)	Accelerated ROW acquisitions to reduce pricing risk on Airport/City Center Guideway (ACCGW) Request For Bids (RFB) due to property access limitations

Area of Risk Management	Type of Action	Description
Interface Management	Airport ConRAC Coordination	Developed a new procurement for seven Drilled Pier Foundations at the future HNL Airport Consolidated Rental Auto Center facility area that removed future schedule impacts to ACCGW package, avoiding significant additional costs, inconvenience and schedule delays
Transit Technology	Interim Opening Schedule	Studied and confirmed the appropriate Interim Opening date to mitigate potential cost or schedule acceleration for vehicle delivery, facility construction and systems installation while maintaining the prudent measure to provide an early testing of driverless train technology and operations
Market Factors	On-Call Construction	Implemented the On-Call Construction contract to address minor items, such as the additional AIS trenching and building remodels for partial property acquisitions, to clear the way for larger guideway and station contracts
Market Factors	Pearl Highlands Parking Garage and Transit Center Delivery Method	Changing the delivery method for Pearl Highlands Parking Garage from DBB to DB allows for greater design flexibility and ability for the contractor to meet schedule requirements
Market Factors	Industry Outreach	Reached out to potential bidders through Industry Days and outreach to enhance understanding of the project's contract packages to maximize the number of qualified bidders, increase competition and minimize the potential for protests.

2.0 TECHNICAL CAPACITY & CAPABILITY RECOMMENDATIONS RESPONSES

1. Appoint Project Director

The FTA and PMOC recommend that HART identify a Project Director to serve as a focal point for all capital program decision making, which in turn, will help streamline the program's organizational decision making. HART agrees it is appropriate given the ramp up of construction activities. HART has identified a candidate to fill this role. The Project Director will, working closely with the Executive office and project staff, serve as the decision-making authority for the capital program decisions. **HART will fill this position by September 30, 2014.**

2. Project Management Plan Update

Within the next three months, HART will complete the update of the Project Management Plan (PMP). HART agrees that up-to-date, comprehensive, and concise management plans and procedures are essential to delivering the Project successfully. HART will update the Project Management Plan in close coordination with the PMOC. **HART will complete and submit the plan by December 1, 2014.**

3. Appoint Permanent Risk Manager

The Risk Manager is a key position for HART in order to responsibly identify, manage, and mitigate project risks. HART selected a Project Manager from the General Engineering Consultant III with extensive experience in risk management to serve as Risk Manager for the Project. **HART appointed a permanent Risk Manager in July 2014.**

4. Streamline HART Organization and Define Roles and Responsibilities

HART's organizational roles and responsibilities will be defined in a synchronized effort with the Project Management Plan update to be **completed by December 1, 2014.**

5. Update Management Plans

All of the sub-area management plans, of which there are nearly 20, are key components of the Project Management Plan. Over the past several months, HART has been updating these plans to reflect the current management structure and strategic planning. HART has also developed a detailed tracking system for each of these plans to monitor progress and to ensure the plans are properly completed on schedule. **HART will complete and submit these plans by December 31, 2014.**

3.0 SCOPE RECOMMENDATIONS RESPONSES

As noted in the Risk Refresh Report, there have been no significant changes to the scope of the Project since the execution of the Full Funding Grant Agreement. About 65 percent, or two-thirds, of the project's contracts have already been issued and design is about 78 percent complete; there is a reduction in the level of uncertainty and overall risk. However, the focus of the Risk Refresh Report was on the contract packages not yet bid or those that have seen significant progress since the Full Funding Grant Agreement was executed. The FTA and PMOC note that level of completion of design packages varies across contract packages. Further, there are several third-party agreements and right-of-way acquisitions outstanding. HART has made significant progress in both these areas.

1. Continued Review and Resolution of all Potential Contract Change Orders

With the new Construction Engineering & Inspection (CE&I) Consultants in place and the addition of key HART management staff, a renewed focus on the review, evaluation and resolution of all outstanding Contract Change Orders is underway. This includes the determination of all potential and pending change issues to verify the merit of those issues and to resolve all outstanding items on existing contracts. HART is actively quantifying the remaining potential change orders to assess the potential risk exposure. This is a key exercise toward risk mitigation because it provides HART management with better information to make timely decisions. In addition, HART is evaluating future procurement documents to apply lessons learned and to reduce risks for similar change orders. HART will also review potential and pending change issues with the FTA/PMOC on a monthly basis as

part of cost containment efforts. **HART will provide monthly progress updates to the PMOC beginning in September 2014.**

2. Process Post ROD Documentation

The process to review design refinements for compliance with the Final Environmental Impact Statement (FEIS), Record of Decision (ROD) and Section 106 Programmatic Agreement (PA) is ongoing. HART's Planning/Environmental staff tracks all potential issues and discusses these items with FTA on a bi-weekly basis. This process has been collaborative and highly effective. With the coming completion of Final Design for the program, these refinements will become less of an issue. **HART anticipates this work will be substantially complete by the end of the first quarter of 2015.**

3. Prioritize Resolution of Third-Party Agreements, Right-of-Way Acquisitions and Other Coordination

A significant risk to the Project is the failure to provide access to the required properties, whether it is from governmental entities via third-party agreements or acquisitions of privately owned property. To respond to this risk, HART has embarked on an accelerated right-of-way acquisition schedule to obtain site access to all remaining properties by the end of 2014. HART has increased the staffing level of its Real Estate Consultant in order to effect simultaneous acquisitions for nearly 160 parcels, **which will be substantially completed by December 15, 2014.**

With a few exceptions, HART was prohibited by a partial injunction by the United States District Court from pursuing any real estate acquisition and relocation activities in the City Center Section of Project from December 27, 2012, until February 18, 2014. The delay caused by the injunction disrupted HART's ability, based on existing staffing, resources, and budgeted levels of effort, to deliver all of the acquisitions needed to support the Master Program Schedule for procurement, utility relocation, and construction of the City Center Section. HART has directly responded to this risk element by increasing staffing levels to allow significant amounts of work to occur simultaneously. HART also believes securing site access of the acquisitions needed for the City Center Section by December 2014 is in the best interest of the Project to most effectively mitigate this delay. The current Master Program Schedule provides Notice to Proceed to the Airport/City Center Guideway Construction Contractor on or about December 15, 2014. Therefore, HART must enable the contractor unimpeded access to required right-of-way at that time. This is now a critical path effort aimed at avoiding possible delays and other claims.

Further, HART has engaged in executive-level discussions, as well as ongoing staff coordination, with key third parties including the University of Hawaii, Aloha Stadium, the United States Navy, Hawaii Department of Transportation (HDOT), Hawaiian Electric Company (HECO), and several private development property owners. The intent of this outreach is to ensure that the decision makers are meeting regularly and to clearly communicate the need to expedite the execution of outstanding agreements. This approach has had a positive effect on building mutual understanding of various organizations' needs, which aids in agreements being completed much faster than through traditional methods. **HART anticipates this activity to be substantially complete by the end of the first quarter of 2015.**

4.0 SCHEDULE RECOMMENDATIONS RESPONSES

1. HART Staffing Needs Forecast

HART is continually evaluating staffing needs to appropriately meet the technical requirements of the Project. Recently, HART added several highly qualified assistant deputies in the Design & Construction Department. HART is in the process of updating the professional services cost estimates to account for these positions and to re-evaluate the overall staffing needs of the organization. Careful resource management, including regular evaluation of staffing levels, will help ensure the Project is delivered on time and within budget. **This will be completed by November 30, 2014.**

2. Schedule Calendar Consistency

The Core System Contractor's baseline and update schedules have been submitted with a 7-day calendar for all design, procurement, manufacturing, and construction activities. HART and the GEC had taken exception to that approach for construction activities and conveyed that such a calendar is unacceptable, unworkable and inconsistent with standards in the industry for these activities. The CSC has acknowledged its need to comply with this requirement and has shifted the majority of its construction activities to a 5-day calendar with holidays, and has submitted a revised schedule update with these changes. HART is currently reviewing CSC's revised baseline and updated schedules. **This will be completed by November 1, 2014.**

3. Staffing Plan

As noted above, HART is continually evaluating the staffing needs and levels to appropriately respond to the technical requirements of the Project. The Staffing & Succession Plan is a component of the Project Management. **This plan will be updated by December 31, 2014.**

4. Contractor Monthly Schedule Updates

HART has made significant improvements in both the current status and submission timeliness of all current Design-Build contracts. Contractors now fully understand HART's need for monthly schedule updates, whether contractually required or not.

Earlier this year, the West Oahu Farrington Highway Guideway (WOFH) and Kamehameha Highway Guideway (KHG) contracts' schedule updates were two and four months behind respectively. The MSF's schedule update was one month behind at that period in time.

The MSF and WOFH schedules are now current. The KHG contractor has committed to making their schedule current by September 30, 2014.

5. Scheduler for Core Systems Contractor (CSC)

HART firmly reiterated its concerns regarding the need for the CSC to significantly improve its Project Control's capability and competence. The CSC subsequently obtained the services of a scheduler with significant transit experience from another AHJV project. Early interaction with that individual has been positive and, at this juncture, reduces the need for a HART to embed its own scheduler at CSC. The CSC schedule has been made current and continuous efforts are being made to convert the construction activities to an appropriate workday schedule. **Action completed. HART will continue to closely monitor the CSC schedule.**

5.0 PROJECT COST RECOMMENDATIONS RESPONSES

There have been considerable pressures on the Project's budget early on, with lengthy procurement protests, Notice to Proceed (NTP) delays incurred on HART's first three design-build construction contracts, and the suspension of construction activities and real estate activities due to two lawsuits. This resulted in delay costs, associated escalation costs that are still to be fully determined and right-of-way acceleration costs. In addition, the current schedule has been tightly compressed and the Project is now procuring its remaining contracts in vastly different market conditions than originally planned. There are significant contracts yet to be procured later in 2014 and early 2015 that will shape the cost profile for the project even further, including: all 21 Stations in several different contract packages; East Guideway; and the Pearl Highlands Garage and Transit Center.

HART's management and oversight has been diligent and innovative, and is grateful for FTA and PMOC support in these actions as we successfully navigate our challenges.

The following measures address recommendations provided in the Risk Refresh report and are prudent steps that are important to minimize and contain exposure to identified risks. They also proactively identify areas that could become a cost concern and offer solutions to mitigating these risks.

1. **Prepare Cost Estimates for Potential Changes**

As noted in section 3.0, a renewed focus on the review, evaluation and resolution of all outstanding contract change orders is underway. This includes the determination of all potential and pending change issues to verify the merit of those issues and to resolve all outstanding items on existing contracts. HART is actively quantifying the remaining potential change orders to assess the potential risk exposure. This is a key exercise toward risk mitigation because it provides HART's management with better information to make timely decisions. In addition, HART is evaluating future procurement documents to apply lessons learned and to reduce risks for similar change orders. HART will also review potential and pending change issues with the FTA/PMOC on a monthly basis as part of cost containment efforts. **This is an on-going effort and HART will provide monthly progress updates to the PMOC.**

2. **Airport & City Center Guideway and City Center Utilities Contract Estimate**

Contract packaging has been an important concern as HART attempts to create an economy of scale to allow for off-island competitors to enter the market realizing their need to blend local and remote resources to achieve an optimal price for the taxpayers' dollars. This contract is projected to be the largest capital contract on the Project and HART has used a variety of acceptable methods and approaches to get the best possible estimate on this contract package. This is a challenge due to the unique supply chain for on island construction taking into account existing and potential sources for labor, materials and equipment. To date this has included a detailed, scrutinized analysis of the multiple cost estimates for this package by HART staff, consultants and the project designers. The results of these estimates, as they are vetted for accuracy, are being considered when making critical decisions on all aspects of the Project. In addition, HART is analyzing the

completeness of the design documents and determining the base path forward to ensure the best possible product is provided to the potential bidders. HART is also evaluating the schedule implications of delaying the release of these documents to ensure the best package possible and analyzing subsequent impacts on the overall schedule. **This will be completed by December 2014.**

3. Right of Way Budget Updates

Paying the upfront price to consultants to accelerate the steps necessary to obtain site access to all parcels by the end of the calendar year attempts to eliminate unnecessary risk factors built into the Airport & City Center Guideway and City Center Utilities bids by addressing the contractor's access concerns. This measure also attempts to significantly reduce the risk for access-related delays similar to those incurred on previous contracts. Further, HART has evaluated and provided the PMOC with a refreshed right of way budget in July 2014. This is also being included in any refresh of the overall project budget. **Completed July 2014.**

4. Refresh Staffing Cost Estimates

As noted in Section 4, HART is in the process of updating the professional services cost estimates to account for these positions and re-evaluating the overall staffing needs of the organization. Careful resource management, including regular evaluation of staffing levels, will help ensure the Project is delivered on time and within budget. **This will be completed by November 30, 2014.**

5. Re-baseline the Project Budget

An action item derived from the Risk Refresh will be to re-baseline the Project budget. In addition to including up-to-date estimates on future construction contracts, this will include the most recent estimates from ROW and updated budgets on HART costs and Professional Services staff. The ROW budget has been under strict evaluation by HART, particularly to ensure that all required elements are accounted for. During the preparation of the Full Funding Grant Agreement budget for ROW, it was unknown how the real estate market in Hawaii would fluctuate over the course of time. Therefore, a market adjustment factor was built into the cost per parcel to account for this uncertainty. Thus far, the market adjustment factor is sufficient and the current forecast for ROW is favorable. HART is in the process of reviewing the soft costs for the Project, which means evaluating professional services costs and the need to ensure adequate technical capability of the organization to support the implementation of the Project. Finally, HART is evaluating appropriate escalation factors for the updated project cost estimate. **This will be completed by the end of the first quarter of 2015.**

6. Other Project Cost Estimate Actions

- Bid Allowances – In the event delays do occur on future construction contracts, HART has included bid line items on its bid tabs to require bidders to quantify the cost of potential delays. This is a cost containment measure that reduces the opportunity for

lengthy negotiations and minimizes the ambiguity of what cost impacts there are to the contractor if delays do occur.

- Agreement with HDOT to Leave Abandoned Utilities in Place – With this recent HDOT agreement, HART has avoided potential changes on the western section of guideway construction valued at up to \$50M (per contractor rough order magnitude estimates) This also significantly reduces this risk on the Project’s Risk Register. This agreement will also provide an opportunity for savings on the recently awarded Airport Section Utility construction contract even though it will require an immediate change to the contract. HART also expects this agreement will have a favorable impact on the upcoming City Center section of utility relocations contract.
- Projectwide Contract Changes – HART has engaged the CE&I consultants to work closely with the project management staff to assist with establishing cost estimates for all changes and eliminating unnecessary changes. This is essential in ensuring the most accurate cost estimate at completion for the overall project.
- Redefine Interim Opening – There are costs associated with an interim opening that could be saved while continuing to test out the various systems, particularly at a time when ridership is expected to be fairly low due to the fact that the system will only be available on the West end.
- Additional Risk Mitigation – Table 2 is a summary of additional risk mitigation that has been in process since the FTA/PMOC Risk Refresh. These items provide additional benefits to the project with minimal cost of implementation illustrating HART’s progressive approach to continuous improvement.

Table 2 - Summary Table of Risk Mitigation

Area of Risk Management	Type of Action	Description	Total Potential Cost/Schedule Benefit
Third-Party Agreements	Back-Up Power	Exploring alternate means of delivering facility and guideway power to mitigate resource constraints on utility companies	To be determined
Third Party Agreements	HDOT Agreement	Agreement with HDOT to leave in place abandoned utilities, avoiding additional construction costs that were not budgeted in the Full Funding Grant Agreement	\$50M – estimated savings
Market Factors	Escalation	Developing a method to address escalation costs for all existing DB	Management reserve is being held against

Area of Risk Management	Type of Action	Description	Total Potential Cost/Schedule Benefit
		contracts that is fair and reasonable	contingency
Market Factors	Industry Outreach	Reached out to potential bidders through Industry Days and outreach to enhance understanding of the project's contract packages to maximize the number of qualified bidders, increase competition and minimize the potential for protests.	Ongoing, value is undetermined
Market Factors	Procurement Documents	Continuous improvement efforts are rolled into each set of contract documents including the quality of design and technical specification documents	Ongoing, value is undetermined
Market Factors	Instructions to Bidders	Bidders are now asked to include as a bid tab item the daily cost of delay in order to know up front the potential cost of schedule delays due to the reduction in overall float in the program	Increased efficiency in change resolution

- **Westside Station Group Bid Results**

Since the completion of the Risk Refresh workshop in April, HART received bids for the Westside Stations Group solicitation. The bids received were considerably higher than the engineer's estimate, the CE&I validation estimate, and the FFGA Budget. The planned budget/estimate was in the \$152M-\$184M range, including Allocated Contingency; the lowest bid received was \$294M and the high bid was \$321M, which is approximately 60 percent higher than estimated.

HART has conducted an internal analysis of the bids to determine what was driving costs higher than estimated. In summary, those cost drivers included:

- Schedule compression – The schedule required for HART to meet the planned 2017 Interim Opening required that all nine stations be under construction at the same time, with little cascading of trades from one work site to the next. Further, there were very specific dates, and strict requirements for access by other HART contractors in order to access the stations for systems, guideway, and elevator/escalator work to be ready for

the opening. This put tremendous pressure on manpower, materials, and equipment availability.

- Complexity of work items – Rail transit station construction is new to Hawaii and presents some complexities for contractors. Most readily identifiable, platform box girder construction was included in the station package and, depending upon the level of experience and/or sophistication of the individual contractor, this may have caused an increase in pricing risk particularly when coupled with the schedule constraints identified above.
- Completeness and Variety of Scope – There are a number of areas that appear to have caused cost risk due to the variables in the scope of work. In addition, the station designs were not as complete as is typically expected for a design-bid-build solicitation package. In addition, the nine stations included three sets of three stations from three different designers. Although one of the designers was tasked with providing uniformity amongst the three sets, contractors were likely to recognize the difficulty in managing the submittal and request for information processes during construction.
- The overall size of the package – This was an extremely large and complex package. Pressures on manpower, equipment, and materials for this much work occurring concurrently contributed to higher cost risk. Inadequate subcontractor bid coverage was likely experienced by all of the general contractors during the procurement period and requests for an extension to the bid period was requested by the bidders, but denied. The bid submission documentation also required the bidders to include the name and subcontractor license number of all subcontractors (at least 40 trades), which is extremely difficult to do when closing a bid on the due date.

This preliminary analysis by HART indicates that relieving the schedule compression is necessary, which will result in HART delaying the planned 2017 Interim Opening until sometime in 2018. HART is currently reviewing the bids and considering our options. If the solicitation were to be canceled, HART would also re-engage with the general contracting and subcontracting communities to get their feedback. Potential strategies moving forward include re-soliciting the west stations in smaller construction packages over the course of the next several months, which should address the manpower, material, and equipment concerns. HART will also spend additional time evaluating the design and other provisions of the contract to tighten language in order to reduce risk.

6.0 RISK AND CONTINGENCY RECOMMENDATIONS RESPONSES

The FTA's Risk Assessment process, required under the New Starts program, is intended to monitor major transit capital project to provide FTA with information and well-grounded professional opinions regarding the reliability of the project scope, cost and schedule. This Risk Refresh process pays special focus on the elements of uncertainty associated with the effectiveness and efficiency of the project's implementation and within the context of various conditions. While the PMOC conducted their technical analysis, HART also engaged the CE&I contractor to complete an independent risk evaluation using all of the same data that was given to PMOC. The results of HART's internal analysis were similar to the FTA and PMOC's. This resource is valuable for HART to continue internal risk assessments at key future milestones in the Project. This also will help HART to identify risk early in order to position itself to avoid rapid reductions of contingency.

1. Review Project Cost Estimate to Determine How to Ensure On-Budget Project

The Risk Refresh models indicates that if no new actions are taken to respond to identified challenges, the Project could see up to 5.4 percent higher costs, or up to \$265M. In order to offset the potential gap, HART has immediately identified a number of potential capital cost recovery measures, either in the form of cost savings or other measures that will be directly reflected in the Project's costs. The value may vary, as analyses are still underway on many of these items. The timing of when these measures can be realized will also be determined on a case-by-case basis. These items include:

- Revising Projects Financial Plan Elements – HART has fully vetted a revised financial plan that conservatively **saves the project more than \$65M** in finance charges by changing the debt financing strategy assumed in the original plan.

HART and the City and County of Honolulu, with input from an independent financial adviser, have reviewed the debt financing plan approved with the FFGA. This team has proposed changes to the debt financing plan to reduce both the amount borrowed and financing costs.

The FFGA debt financing plan anticipated seven annual General Obligation (GO) Bonds issuances totaling \$1.8 billion and utilizing tax exempt commercial paper with a maximum outstanding amount of \$100M. GO bonds were to be issued starting in Fiscal Year (FY) 2014 with principal and interest payments starting in FY 2015.

The proposed updated debt financing plan substantially reduces the total amount borrowed by: accumulating higher current cash balances; restructuring the debt for interest only payments during construction; and increasing the use of commercial paper to \$350M. The above factors and taking advantage of current low short term -interest rates results in the following benefits:

- Substantially reduces total debt issued (\$589M) from \$1,898M to \$1,309M
- Substantially lowers total financing costs (\$64M) from \$215M to \$151M
- Takes advantage of current low variable interest rates
- Increased debt flexibility with the use of commercial paper, quick access to funds at lowest cost
- Improved debt coverage ratios
- Increases project ending balance from \$193M to \$224M
- Reduces use of 5307 Federal Funds by \$33M

The proposed debt financing plan is currently being reviewed by FTA, and will be included in the debt financing Memorandum of Understanding between the City and HART that will be reviewed by the City Council in the fall of 2014.

Additional details on the debt financing changes are included in **Attachment A**.

- Value Engineering (VE) options– There are multiple VE concepts that can be implemented on current station designs and guideway construction. Early estimates on

these VE concepts project **savings of up to \$12M**. HART continues to evaluate strategies to identify additional cost saving measures without compromising the system critical components.

- Fare Collection System – Evaluations are currently ongoing that could potentially reduce the capital cost estimate for the Fare Collection system **reducing the potential contingency exposure by \$20M**. Once this evaluation is completed, and if realized, this will have an immediate favorable impact on the projected contingency drawdown.
- Project Ending Balance – The current financial plan includes a **project ending balance of \$193M**. While evaluations on the financial plan are underway, HART will be working to identify what amount of this project ending balance could be potentially used for capital cost needs.

2. Update the Risk & Contingency Management Plan

A key sub-area management plan of the Project Management Plan is the Risk and Contingency Management Plan (RCMP). With the finalization of the Risk Refresh process, HART can now update the current RCMP and resubmit it to FTA and PMOC, including decision scenarios for various market responses to remaining procurement of contract packages. Elements of this document will undergo significant changes that will be the result of several factors including significantly improving the projects risk management process. Further, project milestones will need to be revised to reflect the projects current schedule now that it has endured beyond past delays. This process also involves the updating of the Risk Register, the secondary mitigation measures, and other technical elements required under the Risk Assessment for New Starts. **HART anticipates completion and submittal to the FTA and PMOC by November 1, 2014.**

3. Development of Secondary Mitigation Measures

The FTA/PMOC Risk Assessment recommends HART develop secondary mitigation measures that amount up to \$195.5M. This contributes to closing the remaining contingency delta, as described previously. HART agrees with the Risk Report that the Project is potentially facing a number of factors outside of the Project's control that could significantly influence the upcoming procurements. During the next 12 months, over \$1.5B in contract awards will be issued. As a proactive and precautionary measure, HART is also providing a variety of secondary mitigation cost saving options that could be implemented in the event that the Project is faced with circumstances beyond its control that could influence the overall cost of the Project. Ultimately the goal is to do everything within the organization's control to keep the Project within budget without implementing any of the items on the secondary mitigation list. But should the need arise and in order to keep the Project on budget, HART is prepared to make decisions as needed to maintain budget.

In response, HART has evaluated its current list and produced a number of potential secondary mitigation measures that cumulatively surpasses the recommended value by the FTA. Evaluations and discussions are ongoing between HART and FTA/PMOC related to the affects implementing any of these measures would have on the Project scope, Full Funding Grant Agreement or other requirements.

The estimated value of the options in this category is up to \$270M. The possible Secondary Mitigation Measures are described below.

- Defer/Eliminate/Substitute Pearl Highlands Parking Structure – This feature provides significant functionality to users of the system, and eliminating the feature is not preferable. However, there are several possible scenarios related to the Parking Garage and Transit Center that can be used to protect the existing budget should costs for future contracts come in higher than budgeted; A) defer the award of this contract until there is cost certainty on other bids, B) defer and seek alternative financing through public/ private partnership with cost recovery through parking fee or Transit Oriented Development recovery, C) possible addition of Pearl Highlands Station to create additional economy of scale, and/or D) explore substitute locations along the route for additional surface parking. **The potential estimated value is \$200M.**
- Utilize Alternative Delivery Method for Parking – Convert all parking to Public/Private Partnership delivery method (less Pearl Highlands parking structure). **The potential estimated value is \$15M.**
- Eliminate all pedestrian bridges at double entry stations– Rely upon at-grade pedestrian crossings. **The potential estimated value is \$22M.**
- Eliminate procurement and installation of all escalators– This measure would not preclude the installation of escalators in that the stations would be built to accept them at a later date. But, the measure would indefinitely defer installation escalators to a later date when funding can be identified without losing current functionality of transit system. **The potential estimated value is \$18M.**
- Reduce Size/Change the Materials canopies– Altering the station canopies is not preferable, but they could be re-evaluated to reduce the size, utilize less expensive materials, or some canopies could be eliminated. This item could also be done in such a way as to not preclude modifying them at later date when funding can be identified. **The potential estimated value is \$15M.**

7.0 CONCLUSION

HART remains committed to delivering a safe, reliable and high-quality transit system on time and within budget. The Project has successfully overcome tremendous challenges, and has made improvements to the project's scope that enhances safety, increases efficiency and, in many cases, reduces costs. Though the legal challenges are behind the Project, the delays have created a compressed schedule that creates a difficult climate and in some cases threatens to increase costs. Through proactive and rigorous review, HART will employ lessons learned, constantly evaluate various risk factors, and will make timely decisions to change course when necessary.

HART, in partnership with FTA and the PMOC, will continue to closely monitor the status of the Project's scope, schedule and budget and proactively plan for and address all of the potential risks outlined in the Risk Refresh Report.



ATTACHEMENT A:

HONOLULU RAIL TRANSIT PROJECT

REVISED DEBT FINANCING PLAN

Updated Debt Financing Plan

August 2014

Attachment A

**UPDATED FINANCING PLAN:
TABLE A-1, CAPITAL PLAN CASH FLOWS**

Updated Table A-1, Capital Plan Cash Flows

(Figures in \$ millions)	Prior to FY 2013	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Updated Total	FFGA Total	Change
Beginning Project Cash Balance	\$ 298	\$ 418	\$ 393	\$ 239	\$ 25	\$ 25	\$ 24	\$ 25	\$ 25	\$ 25	\$ 25	\$ 44	\$ 224	\$ 298	\$ 298	\$ -
Project Funding Sources																
Net GET Surcharge Revenues	\$ 481	\$ 170	\$ 216	\$ 227	\$ 238	\$ 250	\$ 263	\$ 276	\$ 290	\$ 305	\$ 325	\$ 251	\$ -	\$ 3,291	\$ 3,291	\$ -
FTA Section 5309 New Starts Revenues	\$ 65	\$ 80	\$ 291	\$ 383	\$ 321	\$ 230	\$ 181	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,550	\$ 1,550	\$ -
FTA Section 5307 Formula Funds Used for the Project	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 33	\$ 34	\$ 35	\$ 36	\$ 38	\$ -	\$ -	\$ -	\$ 176	\$ 210	\$ (33)
ARRA Funds Used for the Project	\$ 4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4	\$ 4	\$ -
Variable Rate Bond Proceeds (net of issuance cost)	\$ -	\$ -	\$ -	\$ 20	\$ 230	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 250	\$ -	\$ 250
Fixed Rate Bond Proceeds (net of issuance cost)	\$ -	\$ -	\$ -	\$ -	\$ 243	\$ 248	\$ 272	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 763	\$ 1,645	\$ (882)
Proceeds from Tax Exempt Commercial Paper (TECP)	\$ -	\$ -	\$ -	\$ 350	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 350	\$ 700	\$ (350)
Reserve Fund Release	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ -	\$ 140	\$ 140	\$ -
Interest Income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2	\$ (2)
Additional Funds	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Project Sources of Funds	\$ 551	\$ 250	\$ 507	\$ 980	\$ 1,032	\$ 761	\$ 750	\$ 311	\$ 326	\$ 343	\$ 325	\$ 391	\$ -	\$ 6,526	\$ 7,543	\$ (1,018)
Project Capital Costs																
Total Capital Cost	\$ 431	\$ 275	\$ 661	\$ 1,194	\$ 1,024	\$ 730	\$ 572	\$ 61	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,949	\$ 4,949	\$ -
Debt Service and Transfers																
Principal Payment on Variable Rate Bonds for the Project (VAR)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 48	\$ 49	\$ 50	\$ 51	\$ 53	\$ -	\$ 252	\$ -	\$ 252
Interest Payment and Fees on Variable Rate Bonds	\$ -	\$ -	\$ -	\$ -	\$ 1	\$ 7	\$ 5	\$ 5	\$ 4	\$ 3	\$ 2	\$ 1	\$ -	\$ 26	\$ -	\$ 26
Fees on Variable Rate Bonds Issued for the Project (VAR)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2	\$ 2	\$ 1	\$ 1	\$ 1	\$ -	\$ -	\$ -	\$ 8	\$ -	\$ 8
Principal Payment on Fixed Rate Bonds Issued for the Project (FIXE)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 130	\$ 135	\$ 140	\$ 147	\$ 154	\$ -	\$ 707	\$ 1,798	\$ (1,091)
Interest Payment on Fixed Rate Bonds Issued for the Project (FIXEI)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 14	\$ 24	\$ 33	\$ 23	\$ 18	\$ 11	\$ 4	\$ -	\$ 128	\$ 191	\$ (64)
Principal Payment on TECP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 25	\$ 107	\$ 126	\$ 92	\$ -	\$ -	\$ 350	\$ 700	\$ (350)
Interest Payment on TECP	\$ -	\$ -	\$ -	\$ -	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 3	\$ 1	\$ -	\$ -	\$ 32	\$ 10	\$ 22
Fees on TECP	\$ -	\$ -	\$ -	\$ -	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 1	\$ 1	\$ -	\$ -	\$ 11	\$ -	\$ 11
Transfer to Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ 140	\$ -
Transfer from Project Cash Balance to Ongoing Rail Capital and O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 224	\$ 224	\$ 193	\$ 31
Total Project Uses of Funds	\$ 431	\$ 275	\$ 661	\$ 1,194	\$ 1,032	\$ 761	\$ 750	\$ 311	\$ 326	\$ 342	\$ 306	\$ 211	\$ 224	\$ 6,824	\$ 7,841	\$ (1,157)
Total Finance Charges	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1	\$ -	\$ 5	\$ -	\$ -
FFGA Eligible Finance Charges	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2	\$ 1	\$ 1	\$ 1	\$ -	\$ -	\$ -	\$ -	\$ 4	\$ -	\$ -
Net Cash	\$ 120	\$ (25)	\$ (154)	\$ (214)	\$ (0)	\$ (0)	\$ 0	\$ 0	\$ (0)	\$ 0	\$ 19	\$ 180	\$ (224)	\$ -	\$ -	\$ -
Ending Project Cash Balance	\$ 418	\$ 393	\$ 239	\$ 25	\$ 25	\$ 24	\$ 25	\$ 25	\$ 25	\$ 25	\$ 44	\$ 224	\$ -	\$ -	\$ -	\$ -
Reserve Fund Balance																
Beginning Reserve Fund Balance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ 140	\$ 140	\$ 140	\$ 140	\$ -	\$ -	\$ -	\$ -
Deposit to Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ -	\$ -
Interest Income on Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Reserve Fund Release	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (140)	\$ -	\$ (140)	\$ -	\$ -
Ending Reserve Fund Balance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ 140	\$ 140	\$ 140	\$ 140	\$ -	\$ -	\$ -	\$ -	\$ -

* Maximum TECP outstanding totals \$350 m in the Updated Plan and \$100 m in FFGA

** Debt Reserve in FFGA is included in the \$1,798 Fixed Rate Bond Total but shown separately for comparison purposes

Attachment B

**UPDATED FINANCING PLAN:
CASH FLOW ANALYSIS AND BOND
DETAIL**

MAY 15, 2014

Honolulu Authority for Rapid Transportation
Cash Flow Analysis and Bond Detail

Borrowing Assumptions

- ❑ CP borrowing rate = 1.55%
- ❑ Variable Rate Bonds borrowing rate = 2.0%
- ❑ Fixed Rate Bonds borrowing rate
 - ❑ Premium coupon structure
 - Representative of bond structures in low yield environment
 - ❑ Yields are AAA MMD plus a 6 – 30 bps pricing spread
 - ❑ Cushion for each subsequent year of 30 bps to account for increasing rates

Financing Assumptions	
Target Fund Balance	\$ 25,000,000
Commercial Paper	
CP Maximum	\$ 350,000,000
Interest Rate	1.55%
Liquidity Fee	0.50%
CP Dealer Fee	0.05%
Variable Rate Bonds	
Variable Rate	2.00%
SBPA/LOC Fee	0.50%
Remarketing Fee	0.10%
Bond	
Cost of Issuance	\$ 700,000
Underwriter's Discount	\$4/bond
DSRF Contribution	\$ 140,000,000

Bond Borrowing Rate Assumptions					
Year	AAA GO 4/9/2014	Pricing Spread	Yield	Volatility Spread	Coupon
1	0.15%	6	0.21%	30	3.00%
2	0.39%	12	0.51%		4.00%
3	0.68%	12	0.80%		4.00%
4	0.98%	13	1.11%		5.00%
5	1.26%	13	1.39%		5.00%
6	1.60%	18	1.78%		
7	1.88%	21	2.09%		
8	2.12%	21	2.33%		
9	2.29%	21	2.50%		
10	2.42%	21	2.63%		
11	2.54%	22	2.76%		
12	2.65%	23	2.88%		
13	2.76%	24	3.00%		
14	2.86%	30	3.16%		
15	2.95%	30	3.25%		

Cash Flow Table

(Figures in \$ millions)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Beginning Project Cash Balance	\$ 418	\$ 393	\$ 239	\$ 25	\$ 25	\$ 25	\$ 25	\$ 25	\$ 25	\$ 25	\$ 44	\$ 224	\$ 418
Project Funding Sources													
Net GET Surcharge Revenues	\$ 170	\$ 216	\$ 227	\$ 238	\$ 250	\$ 263	\$ 276	\$ 290	\$ 305	\$ 325	\$ 251		\$ 2,811
FTA Section 5309 New Starts Revenues	\$ 80	\$ 291	\$ 383	\$ 321	\$ 230	\$ 181							\$ 1,486
FTA Section 5307 Formula Funds Used for the Project					\$ 33	\$ 34	\$ 35	\$ 36	\$ 38				\$ 176
ARRA Funds Used for the Project													\$ -
Variable Rate Bond Proceeds (net of issuance cost)			\$ 20	\$ 230									\$ 250
Fixed Rate Bond Proceeds (net of issuance cost)				\$ 243	\$ 248	\$ 272							\$ 763
Proceeds from Tax Exempt Commercial Paper (TECP)		\$ -	\$ 350	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 350
Reserve Fund Release	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ -	\$ 140
Interest Income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Additional Funds													\$ -
Total Project Sources of Funds	\$ 250	\$ 507	\$ 980	\$ 1,032	\$ 761	\$ 750	\$ 311	\$ 326	\$ 343	\$ 325	\$ 391	\$ -	\$ 5,976
Project Capital Costs													
Total Capital Cost	\$ 275	\$ 661	\$ 1,194	\$ 1,024	\$ 730	\$ 572	\$ 61						\$ 4,517
Debt Service and Transfers													
Principal Payment on Variable Rate Bonds Issued for the Project (VAR)			\$ -	\$ -	\$ -	\$ -	\$ 48	\$ 49	\$ 50	\$ 51	\$ 53	\$ -	\$ 252
Interest Payment and Fees on Variable Rate Bonds Issued for the Project (VAR)			\$ -	\$ 1	\$ 7	\$ 5	\$ 5	\$ 4	\$ 3	\$ 2	\$ 1	\$ -	\$ 26
Fees on Variable Rate Bonds Issued for the Project (VAR)			\$ -	\$ 0	\$ 2	\$ 2	\$ 1	\$ 1	\$ 1	\$ 0	\$ 0	\$ -	\$ 8
Principal Payment on Fixed Rate Bonds Issued for the Project (FIXED)			\$ -	\$ -	\$ -	\$ 130	\$ 135	\$ 140	\$ 147	\$ 154	\$ -	\$ -	\$ 707
Interest Payment on Fixed Rate Bonds Issued for the Project (FIXED)			\$ -	\$ 14	\$ 24	\$ 33	\$ 23	\$ 18	\$ 11	\$ 4	\$ -	\$ -	\$ 128
Principal Payment on TECP		\$ -	\$ -	\$ -	\$ -	\$ 25	\$ 107	\$ 126	\$ 92	\$ -	\$ -	\$ -	\$ 350
Interest Payment on TECP		\$ -	\$ -	\$ 5	\$ 5	\$ 5	\$ 5	\$ 3	\$ 1	\$ -	\$ -	\$ -	\$ 32
Fees on TECP		\$ -	\$ -	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 1	\$ 1	\$ -	\$ -	\$ 11
Transfer to Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140
Transfer from Project Cash Balance to Ongoing Rail Capital and O&M Cost												\$ 224	\$ 224
Total Project Uses of Funds	\$ 275	\$ 661	\$ 1,194	\$ 1,032	\$ 761	\$ 750	\$ 311	\$ 326	\$ 343	\$ 306	\$ 211	\$ 224	\$ 6,394
Net Cash	\$ (25)	\$ (154)	\$ (214)	\$ 0	\$ 0	\$ 0	\$ (0)	\$ -	\$ -	\$ 19	\$ 180	\$ (224)	\$ (418)
Ending Project Cash Balance	\$ 393	\$ 239	\$ 25	\$ 25	\$ 25	\$ 25	\$ 25	\$ 25	\$ 25	\$ 44	\$ 224	\$ -	\$ -
Reserve Fund Balance													
Beginning Reserve Fund Balance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ 140	\$ 140	\$ 140	\$ 140	\$ -	\$ -
Deposit to Reserve Fund	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140
Interest Income on Reserve Fund													\$ -
Reserve Fund Release	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (140)	\$ -	\$ (140)
Ending Reserve Fund Balance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 140	\$ 140	\$ 140	\$ 140	\$ 140	\$ -	\$ -	\$ -
Coverage													
GO Bond Debt Service Coverage				293.60x	10.57x	8.61x	1.27x	1.37x	1.44x	1.53x	1.19x		Min
Total Debt Service Coverage (GO Bonds and Commercial Paper)				29.16x	8.07x	6.94x	1.10x	0.89x	0.89x	1.06x	1.19x		1.19x
													0.89x



Bond Detail



Fixed Rate Bond Series

Series 2014F	
Sources	
Par	\$ -
Premium	\$ -
Total Sources	\$ -
Uses	
Project Fund	\$ -
Reserve Fund	\$ -
Cost of Issuance	\$ -
Underwriter's Discount	\$ -
Additional Proceeds	\$ -
Total Uses	\$ -

Fiscal Year	Maturity	Par Amount	Coupon	Yield	Interest	Debt Service
2015	12/1/2014	\$ -			\$ -	\$ -
2016	12/1/2015	\$ -		0.51%	\$ -	\$ -
2017	12/1/2016	\$ -		0.81%	\$ -	\$ -
2018	12/1/2017	\$ -		1.10%	\$ -	\$ -
2019	12/1/2018	\$ -	3.00%	1.41%	\$ -	\$ -
2020	12/1/2019	\$ -	4.00%	1.69%	\$ -	\$ -
2021	12/1/2020	\$ -	4.00%	2.08%	\$ -	\$ -
2022	12/1/2021	\$ -	5.00%	2.39%	\$ -	\$ -
2023	12/1/2022	\$ -	5.00%	2.63%	\$ -	\$ -
Total		\$ -			\$ -	\$ -

All-In TIC: N/A

Series 2015F	
Sources	
Par	\$ 221,165,000.00
Premium	\$ 23,586,078.15
Total Sources	\$ 244,751,078.15
Uses	
Project Fund	\$ 243,161,000.00
Reserve Fund	\$ -
Cost of Issuance	\$ 700,000.00
Underwriter's Discount	\$ 884,660.00
Additional Proceeds	\$ 5,418.15
Total Uses	\$ 244,751,078.15

Fiscal Year	Maturity	Par Amount	Coupon	Yield	Interest	Debt Service
2016	12/1/2015	\$ -			\$ -	\$ -
2017	12/1/2016	\$ -		0.81%	\$ 14,072,775	\$ 14,072,775
2018	12/1/2017	\$ -		1.11%	\$ 9,381,850	\$ 9,381,850
2019	12/1/2018	\$ 40,750,000	3.00%	1.40%	\$ 8,770,600	\$ 49,520,600
2020	12/1/2019	\$ 42,210,000	4.00%	1.71%	\$ 7,315,150	\$ 49,525,150
2021	12/1/2020	\$ 43,930,000	4.00%	1.99%	\$ 5,592,350	\$ 49,522,350
2022	12/1/2021	\$ 45,960,000	5.00%	2.38%	\$ 3,564,750	\$ 49,524,750
2023	12/1/2022	\$ 48,315,000	5.00%	2.69%	\$ 1,207,875	\$ 49,522,875
Total		\$ 221,165,000			\$ 49,905,350	\$ 271,070,350

All-In TIC: 2.33%

Note: Series 2015F is issued on 12/1/15 during FY2016

Fixed Rate Bond Series

Series 2016F	
Sources	
Par	\$ 229,420,000.00
Premium	\$ 20,197,595.20
Total Sources	\$ 249,617,595.20
Uses	
Project Fund	\$ 247,997,000.00
Reserve Fund	\$ -
Cost of Issuance	\$ 700,000.00
Underwriter's Discount	\$ 917,680.00
Additional Proceeds	\$ 2,915.20
Total Uses	\$ 249,617,595.20

Fiscal Year	Maturity	Par Amount	Coupon	Yield	Interest	Debt Service
2017	12/1/2016	\$ -			\$ -	\$ -
2018	12/1/2017	\$ -		1.11%	\$ 14,598,000	\$ 14,598,000
2019	12/1/2018	\$ 42,275,000	3.00%	1.41%	\$ 9,097,875	\$ 51,372,875
2020	12/1/2019	\$ 43,780,000	4.00%	1.70%	\$ 7,588,150	\$ 51,368,150
2021	12/1/2020	\$ 45,570,000	4.00%	2.01%	\$ 5,801,150	\$ 51,371,150
2022	12/1/2021	\$ 47,675,000	5.00%	2.29%	\$ 3,697,875	\$ 51,372,875
2023	12/1/2022	\$ 50,120,000	5.00%	2.68%	\$ 1,253,000	\$ 51,373,000
Total		\$ 229,420,000			\$ 42,036,050	\$ 271,456,050

All-In TIC 2.37%

Series 2017F	
Sources	
Par	\$ 256,020,000.00
Premium	\$ 17,600,252.00
Total Sources	\$ 273,620,252.00
Uses	
Project Fund	\$ 271,893,000.00
Reserve Fund	\$ -
Cost of Issuance	\$ 700,000.00
Underwriter's Discount	\$ 1,024,080.00
Additional Proceeds	\$ 3,172.00
Total Uses	\$ 273,620,252.00

Fiscal Year	Maturity	Par Amount	Coupon	Yield	Interest	Debt Service
2018	12/1/2017	\$ -			\$ -	\$ -
2019	12/1/2018	\$ 47,175,000	3.00%	1.41%	\$ 15,582,900	\$ 62,757,900
2020	12/1/2019	\$ 48,860,000	4.00%	1.71%	\$ 8,467,900	\$ 57,327,900
2021	12/1/2020	\$ 50,855,000	4.00%	2.00%	\$ 6,473,600	\$ 57,328,600
2022	12/1/2021	\$ 53,200,000	5.00%	2.31%	\$ 4,126,500	\$ 57,326,500
2023	12/1/2022	\$ 55,930,000	5.00%	2.59%	\$ 1,398,250	\$ 57,328,250
Total		\$ 256,020,000			\$ 36,049,150	\$ 292,069,150

All-In TIC 2.43%

Note: Series 2016F is issued on 12/1/16 during FY2017
Series 2017F is issued on 12/1/17 during FY2018

Variable Rate Bond Series

Series 2014V	
Sources	
Premium	20,785,000.00
Total Sources	20,785,000.00
Uses	
Project Fund	20,000,000.00
Reserve Fund	-
Cost of Issuance	700,000.00
Underwriter's Discount	83,140.00
Additional Proceeds	1,860.00
Total Uses	20,785,000.00

Fiscal Year	Maturity	Par Amount	Coupon/Yield	Interest	Fees	Debt Service
2015	12/1/2014	\$ -		\$ -	\$ -	\$ -
2016	12/1/2015	\$ -		\$ 623,550	\$ 187,065	\$ 810,615
2017	12/1/2016	\$ -		\$ 415,700	\$ 124,710	\$ 540,410
2018	12/1/2017	\$ -		\$ 415,700	\$ 124,710	\$ 540,410
2019	12/1/2018	\$ 3,990,000	2.00%	\$ 375,800	\$ 112,740	\$ 4,478,540
2020	12/1/2019	\$ 4,075,000	2.00%	\$ 295,150	\$ 88,545	\$ 4,458,695
2021	12/1/2020	\$ 4,155,000	2.00%	\$ 212,850	\$ 63,855	\$ 4,431,705
2022	12/1/2021	\$ 4,240,000	2.00%	\$ 128,900	\$ 38,670	\$ 4,407,570
2023	12/1/2022	\$ 4,325,000	2.00%	\$ 43,250	\$ 12,975	\$ 4,381,225
Total		\$ 20,785,000		\$ 2,510,900	\$ 753,270	\$ 24,049,170

All-In TIC	3.29%
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Series 2015V	
Sources	
Premium	231,630,000.00
Total Sources	231,630,000.00
Uses	
Project Fund	230,000,000.00
Reserve Fund	-
Cost of Issuance	700,000.00
Underwriter's Discount	926,520.00
Additional Proceeds	3,480.00
Total Uses	231,630,000.00

Fiscal Year	Maturity	Par Amount	Coupon/Yield	Interest	Fees	Debt Service
2016	12/1/2015	\$ -		\$ -	\$ -	\$ -
2017	12/1/2016	\$ -		\$ 6,948,900	\$ 2,084,670	\$ 9,033,570
2018	12/1/2017	\$ -		\$ 4,632,600	\$ 1,389,780	\$ 6,022,380
2019	12/1/2018	\$ 44,490,000	2.00%	\$ 4,187,700	\$ 1,256,310	\$ 49,934,010
2020	12/1/2019	\$ 45,390,000	2.00%	\$ 3,288,900	\$ 986,670	\$ 49,665,570
2021	12/1/2020	\$ 46,310,000	2.00%	\$ 2,371,900	\$ 711,570	\$ 49,393,470
2022	12/1/2021	\$ 47,245,000	2.00%	\$ 1,436,350	\$ 430,905	\$ 49,112,255
2023	12/1/2022	\$ 48,195,000	2.00%	\$ 481,950	\$ 144,585	\$ 48,821,535
Total		\$ 231,630,000		\$ 23,348,300	\$ 7,004,490	\$ 261,982,790

All-In TIC	2.75%
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Note: Series 2014V is issued on 12/1/14 during FY2015
Series 2015V is issued on 12/1/15 during FY2016

Commercial Paper

Commercial Paper	
Max. Amount Outstanding	\$ 350,000,000
Total Drawn	\$ 350,000,000
Interest Rate	1.55%
Liquidity Fee	0.50%
CP Dealer Fee	0.05%

Fiscal Year	Principle Amount	Interest	Fees	Debt Service
2015	\$ -	\$ -	\$ -	\$ -
2016	\$ -	\$ 5,425,000	\$ 1,925,000	\$ 7,350,000
2017	\$ -	\$ 5,425,000	\$ 1,925,000	\$ 7,350,000
2018	\$ -	\$ 5,425,000	\$ 1,925,000	\$ 7,350,000
2019	\$ 24,606,065	\$ 5,425,000	\$ 1,925,000	\$ 31,956,065
2020	\$ 106,821,262	\$ 5,043,606	\$ 1,789,667	\$ 113,654,535
2021	\$ 126,362,699	\$ 3,387,876	\$ 1,202,150	\$ 130,952,725
2022	\$ 92,209,974	\$ 1,429,255	\$ 507,155	\$ 94,146,383
2023	\$ -	\$ -	\$ -	\$ -
2024	\$ -	\$ -	\$ -	\$ -
2025	\$ -	\$ -	\$ -	\$ -
Total	\$ 350,000,000	\$ 31,560,737	\$ 11,198,971	\$ 392,759,708

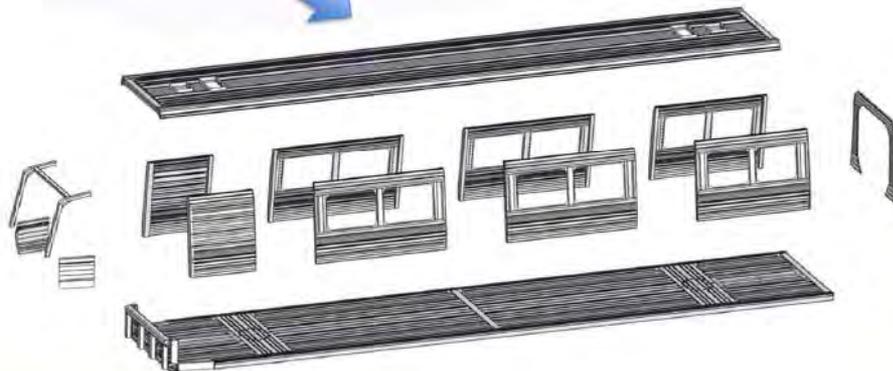
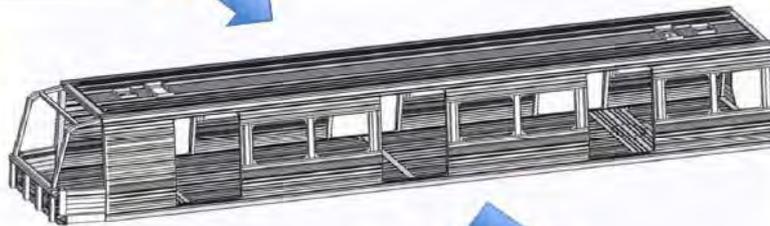
ATTACHMENT F



Vehicle Profile Samples

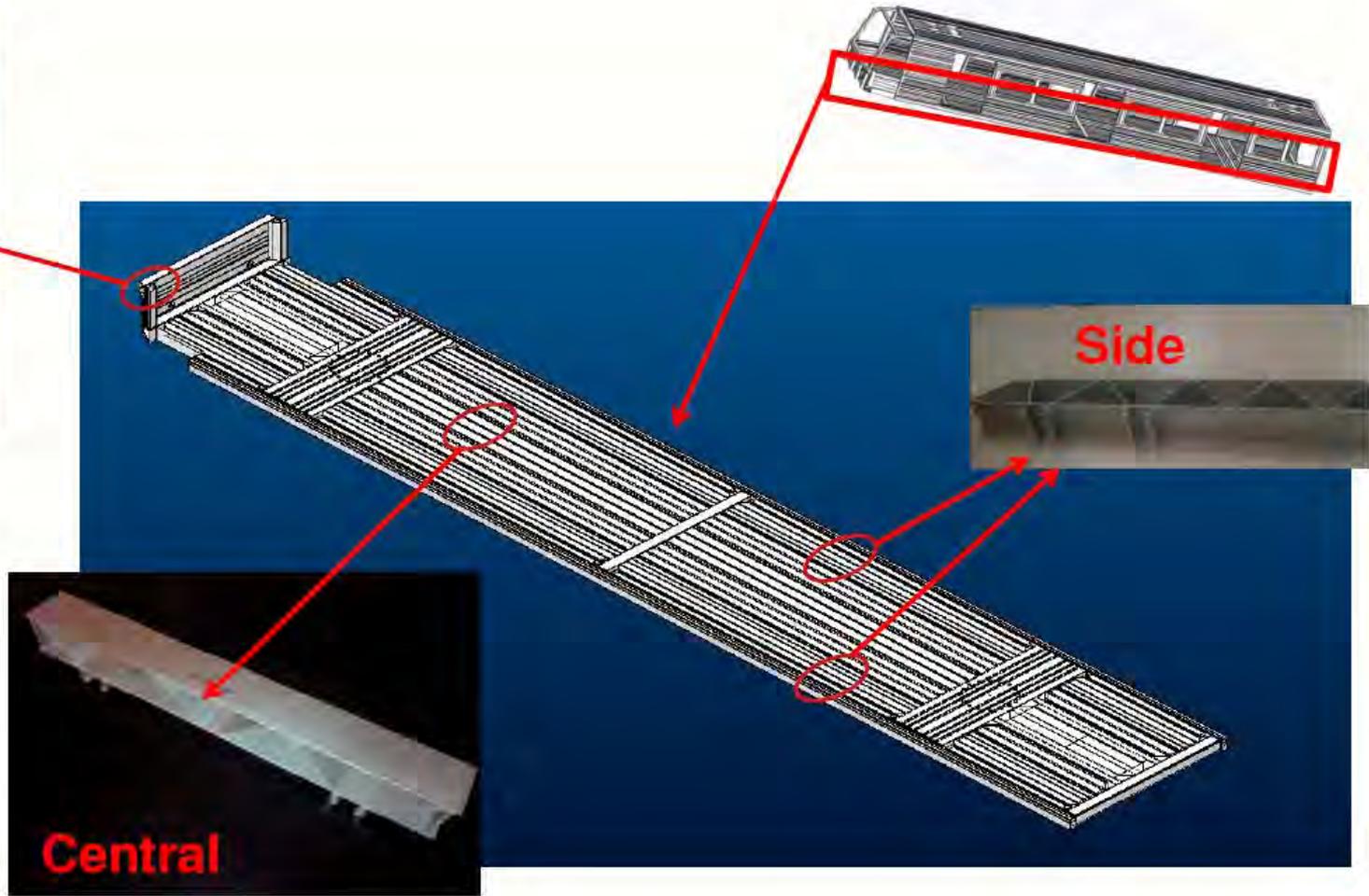
CEO Report

Carshell Manufacturing Concept

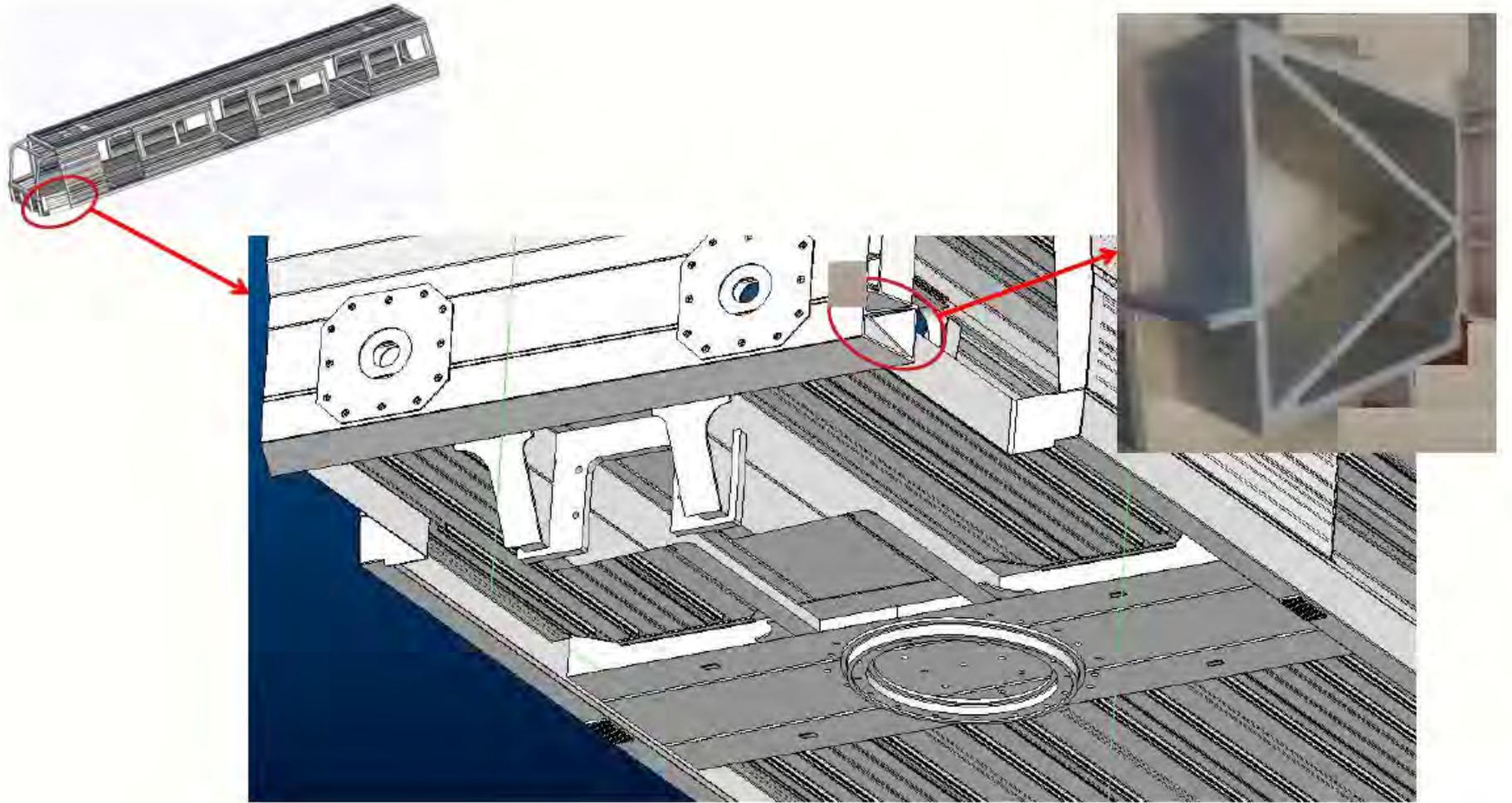


Bottom Plate and Shelf

(cab wall/underframe)

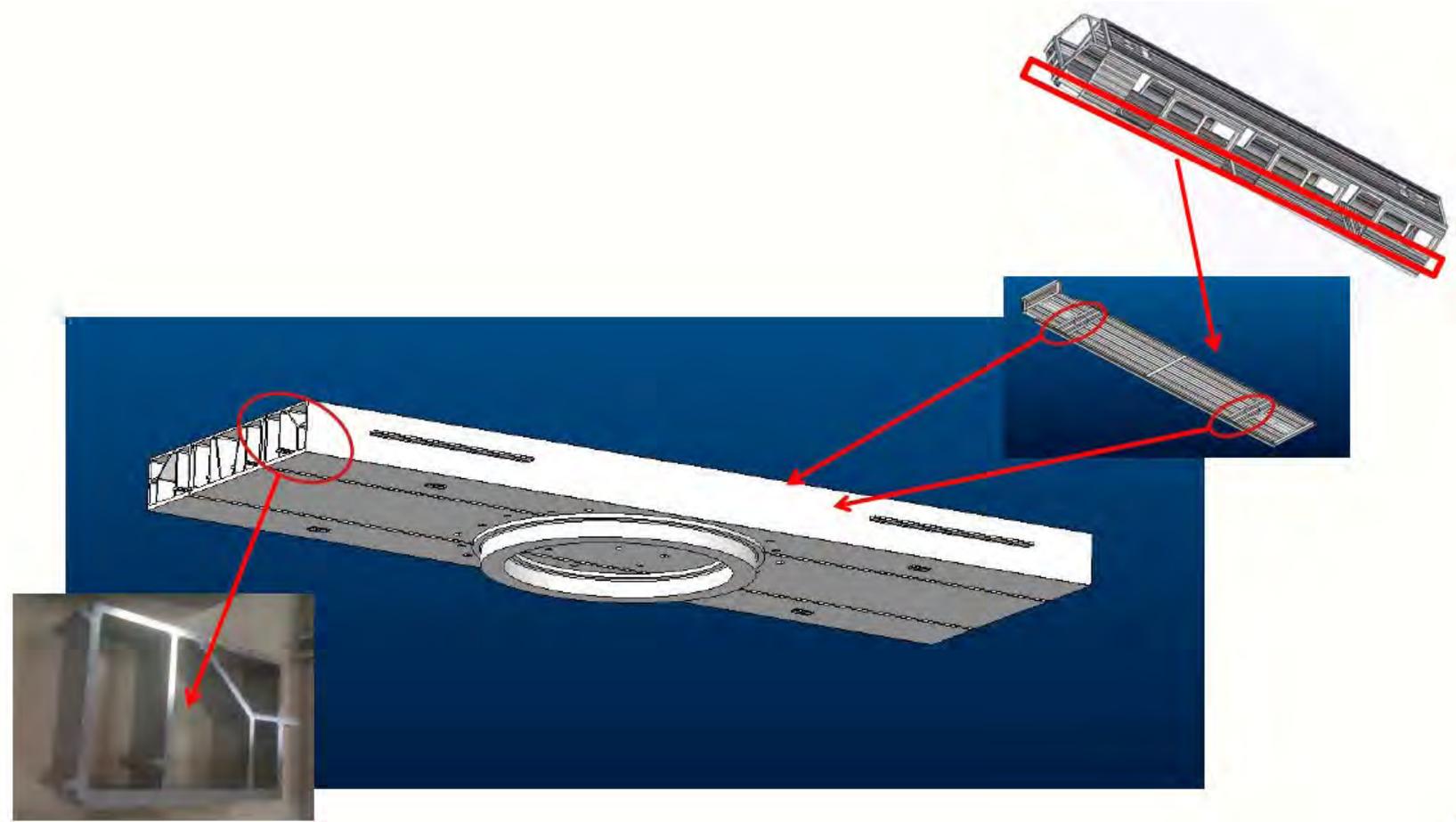


Endsill (front-end)



Bolster Beam

(underframe)



Mahalo!

