

PMOC REPORT

OP 37 – Rail Fleet Management Plan

(Review of March 2012 Rev. 01 Red-lined Draft)

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

July 2012 (FINAL)

PMOC Contract Number: DTFT60-09-D-00012

Task Order No. 2: Honolulu

Project No: DC-27-5140

Work Order No. 3

OPs Referenced: OP 37

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Length of Time Assigned: Five Years (November 23, 2009 through November 22, 2014)

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1.0 EXECUTIVE SUMMARY

The Honolulu Authority for Rapid Transportation (HART or “grantee”) is preparing an application for a Full Funding Grant Agreement (FFGA) for implementation of a major capital initiative for constructing and activating the Honolulu Rail Transit Project (“Project”) for rail service in Honolulu.

At the request of Federal Transit Administration (FTA), the Jacobs Engineering Group, Inc. (Jacobs) Project Management Oversight Contractor (PMOC) performed a follow-up review of the Rail Fleet Management Plan (RFMP) March 2012 “red-lined” draft submitted by the grantee, as part of the ongoing effort of the PMOC team’s oversight responsibility for the Project as related to the FTA’s grant process. The PMOC had performed an earlier evaluation of the RFMP draft dated April 2011 (with “red-lined” version of July 13, 2011).

Currently, the grantee has begun the execution of the Core Systems Contract (CSC), which was awarded in early 2012 to Ansaldo Honolulu JV (Ansaldo). It includes procurement of rail vehicles, procurement & installation of systems equipment, and operation and maintenance of the vehicle fleet. Ansaldo’s vehicle supplier is its sister company AnsaldoBreda, which is headquartered in Pistoia, Italy and has a final assembly plant in Pittsburg, California. Much of the basis for the RFMP is dependent upon the Core System Contract provisions and Ansaldo’s proposed vehicle and operations & maintenance details included in its Best and Final Offer (BAFO). Implementation of Ansaldo’s contract is essential and critical to Final Design and construction, as the vehicle, systems design, and operations planning will dictate critical features of all other contracts.

The PMOC utilized FTA Oversight Procedure (OP) 37 to perform the follow-up review of this RFMP update and followed a process that consisted of identifying references for assessment of the plan contents and performing as-needed analysis to validate calculations and claims made by HART in the RFMP. This report consists of PMOC’s follow-up review findings of the RFMP March 2012 “red-lined” draft. The major changes to the RFMP document are to address HART as the manager of the Honolulu Transit System.

Per OP 37 reporting requirements in Section 7.0, our review findings, comments, conclusion and recommendations are presented in this report and in two appendices titled:

- Appendix 1 – OP 37, Appendix B RFMP Checklist – Grantee Compliance
- Appendix 2 – OP 37, Appendix C RFMP Table of Contents –Grantee Compliance

PMOC’s review focused on the following objectives to assess whether:

- The RFMP is generally complete in the description of the fleet management planning, and that it complies with the FTA guidelines.
- The grantee has generally complied with OP 37 Appendix B and C requirements.
- The RFMP is satisfactory to be accepted as a required deliverable for FFGA application.

The PMOC reviewed this red-lined RFMP document to assess compliance with appropriate FTA Guidance and found the document generally followed FTA’s 8-step process for Operations Spare Ratio (OSR) computation. The PMOC noted that grantee has complied with OP 37 guidance, the

majority of the PMOC previous comments have been satisfactorily addressed, and that grantee has agreed to update the remaining open items in the next revision of the RFMP. Our responses in this report are primarily to enhance the RFMP as it progresses through the construction phase. It will then require additional details to ensure collection of needed data or monitoring of the defined processes.

The PMOC anticipates that the next revision of the RFMP would be available after the FFGA when the Core Systems Contractor (Ansaldo Honolulu Joint Venture) begins its work in earnest (i.e. within one year of initial Notice to Proceed). That revision should address and/or provide additional detail on the following topics:

- Service operations and vehicle demand forecasting
- Planned fleet Maintenance practices and management staffing that will be provided through CSC
- Planned use of Maintenance Statistics and Maintenance Strategy as provided through the CSC
- MSF functionality and vehicle availability

In addition to providing additional detail in the areas noted above, the grantee should address, in the next update of the RFMP, PMOC's comments as annotated in this report as well as those in "Appendix B:OP 37, Appendix B FMP Checklist – Grantee Compliance" of the PMOC's report.

In conclusion, this red-lined draft RFMP (Rev.01 dated March 2012) complies with the FTA guidance. The PMOC would recommend that this RFMP update be accepted as a deliverable for the FFGA application.

The PMOC also recommends that a workshop be conducted with the grantee to discuss the details needed in the next update of the RFMP to ensure compliance during implementation of the Project.

2.0 INTRODUCTION

The Honolulu Authority for Rapid Transportation (HART or “grantee”) is preparing an application for a Full Funding Grant Agreement (FFGA) for implementation of a major capital initiative for constructing and activating the Honolulu Rail Transit Project (“Project”) for rail service in Honolulu.

At the request of Federal Transit Administration (FTA), the Jacobs Engineering Group, Inc. (Jacobs) Project Management Oversight Contractor (PMOC) performed a follow-up review of the Rail Fleet Management Plan (RFMP) March 2012 “red-lined” draft submitted by grantee’s manager Honolulu Authority for Rapid Transportation (HART), as part of the ongoing effort of the PMOC team’s oversight responsibility for the Project as related to the FTA’s grant process. The PMOC had performed an earlier evaluation of the RFMP draft dated April 2011 (with “red-lined” version of July 13, 2011).

Currently, the grantee has begun the execution of the Core Systems Contract (CSC), which was awarded in early 2012 to Ansaldo Honolulu JV (Ansaldo). It includes procurement of rail vehicles, procurement & installation of systems equipment, and operation and maintenance of the vehicle fleet. Ansaldo’s vehicle supplier is its sister company AnsaldoBreda, which is headquartered in Pistoia, Italy and has a final assembly plant in Pittsburg, California. Much of the basis for the RFMP is dependent upon the Core System Contract provisions and Ansaldo’s proposed vehicle and operations & maintenance details included in its Best and Final Offer (BAFO). Implementation of Ansaldo’s contract is essential and critical to Final Design and construction, as the vehicle, systems design, and operations planning will dictate critical features of all other contracts.

2.1 PMOC Review Process

The PMOC utilized FTA Oversight Procedure (OP) 37 to perform the follow-up review of this RFMP update and followed a process that consisted of identifying references for assessment of the plan contents and performing as-needed analysis to validate calculations and claims made by HART in the RFMP. This report consists of PMOC’s follow-up review findings of the RFMP March 2012 “red-lined” draft. The major changes to the RFMP document are to address HART as the manager of the Honolulu Transit System.

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- The grantee has generally complied with OP 37 Appendix B and C requirements.
- The RFMP is satisfactory to be accepted as a required deliverable for FFGA application.

The PMOC reviewed this red-lined RFMP document to assess compliance with appropriate FTA Guidance and found the document generally followed FTA’s 8-step process for Operations Spare Ratio (OSR) computation.

2.2 FTA References

In addition to FTA OP 37, which specifically provides guidance on the review of fleet management plans, FTA regulation and guidelines for the data to be included in the RFMP are provided in the following documents:

- FTA Circular C5200.1A: Full Funding Grant Agreement Guidance
- FTA Circular C9030.1D: Urbanized Area Formula Program: Grant Application Instructions
- FTA Memorandum (1999) by Hiram Walker: “Guidance: Rail Fleet Management Plans”.

FTA’s objective in issuing such guidance is to encourage the grantee to properly plan for and carry out the overall management of its vehicle fleet. It further states that the RFMP should address the key factors necessary to make effective decisions on equipment needs and future vehicle demand, including maintaining a spare ratio of rail cars based on industry “best practices” to avoid inefficient railcar investments.

To effectively assess and monitor a grantee’s rail fleet management and performance, FTA requires the grantee to give a clear explanation of its rail system status in the past, present, and as projected in the near future in major areas, such as ridership, system description and expansion plans, service standards and load factors, passenger demand and peak vehicle requirements, details of existing and planned vehicle procurements, maintainability and reliability standards, train failure definitions and actions, and vehicle Demand/Supply Balance analysis including OSR. Each RFMP should consider a minimum timeframe of ten years from the date of the initial analysis.

3.0 OVERVIEW OF RFMP DOCUMENT

This draft RFMP update is composed of the following sections:

- 1.0 Introduction – briefly describes the purpose of the RFMP and grantee’s objectives in defining the passenger service fleet development and maintenance.
- 2.0 Abbreviations and Definitions – provides a listing of abbreviations and acronyms utilized in the plan as well as definitions of terms related to the fleet of railcars and car maintenance.
- 3.0 Project Description – provides an overview of the planned system, including major elements, elevated alignment, planned and potential future extensions/expansion, station and guideway overviews, description of the revenue vehicles (including key parameters), and planned service hours and headways.
- 4.0 Demand for Revenue Vehicles – describes (through the FTA recommended eight step process) the fleet size determination, and initial fleet procurement information including anticipated vehicle utilization and overhauls anticipated.
- 5.0 Maintenance Plan – provides an overview of Maintenance philosophy, categorization of train failure definitions, a conceptual view of Maintenance strategy, summary intent for Preventive Maintenance (including pre-revenue, in revenue, periodic, overhauls, other systems), and Service Mode and Reliability Measures.
- 6.0 Rail Vehicle Maintenance Facility – elaborates on the planned Maintenance and Storage Facility (MSF), including functional areas, a site plan, and MSF vehicle capacity.

No appendices have been provided in this March 2012 draft RFMP.

4.0 PMOC FINDINGS, OBSERVATIONS AND COMMENTS

The PMOC had conducted a review of grantee's initial Rail Fleet Management Plan (RFMP) draft dated April 2011 to assess compliance with appropriate FTA Guidance. The PMOC provided its findings in a June 3, 2011 PMOC report, which noted that the RFMP generally followed FTA's 8-step process for OSR computation. However, that RFMP revision had several key topics with limited detail or cursory information and did not fully address guidance provided in FTA reference documents. Subsequent to that submission, the grantee submitted for PMOC's review July 13, 2011 red-lined RFMP update, and followed up with conference calls between the PMOC and the grantee staff to resolve deficiencies. The PMOC noted in its July 2011 report those items that were resolved or the remaining items that grantee had agreed to update in the next revision of the RFMP. It should be noted that this was based on the assumption at the time that the Core Systems Contractor would be provided Notice to Proceed in November 2011, which did not happen.

Since PMOC's earlier reviews of the RFMP noted above, this report addresses PMOC's review of the most current red-lined RFMP Rev 01, March 2012 update provided by the grantee.

Upon review of this Red-lined RFMP update, the PMOC does not offer any new comments; and provides a comment-by-comment resolution of its previous comments, provided in the Final Report as transmitted to the FTA in November 17, 2011 as annotated below in *italics*:

4.1 General Comments

- (1) Suggest adding a page with signature blocks for author, approval, etc. for conformance verification, and a page for history of changes.

Resolution: Grantee had previously complied.

- (2) A list of tables, charts, figures, exhibits, illustrations, etc. in the Table of Contents would be helpful.

Resolution: Grantee had previously complied.

- (3) Suggest providing an Executive Summary to summarize the plan organization, and other key topics/details.

Resolution: Grantee had previously complied, but an Executive Summary does not appear in the March 2012 draft.

4.2 Specific Comments

Section 1 Introduction

- (1) Page 1-1, 1.1 Purpose, 1st paragraph – Optional O&M period should be explained.

Resolution: Grantee has deleted this reference.

Section 2 Abbreviations and Definitions

- (1) Page 2-1, 2.1 Abbreviations – The following terms are defined, but do not appear to have been used: MMIS, PM, QA, QC, TBD.

Resolution: Grantee had previously complied.

- (2) Page 2-1, 2.1 Abbreviations – The following terms are used, but not defined: O&M, BAFO, CSC, ADA, CCTV, HSBC, PVR (not used but should be defined as key in an RFMP), and OSR (not used but should be defined as key in an RFMP).

Resolution: Grantee had previously complied.

- (3) Page 2-1, 2.2 Definitions – The terms Fixed Signal and Right of Way are defined, but do not appear to have been used.

Resolution: Grantee previously complied.

- (4) Page 2-1, 2.2 Definitions – The following terms are used, but not defined: Period #1, Period #2, Patronage, E-cars, M-cars, Load Factor, Minimum vs. Maximum Headway, AW2 (as well as AW0, AW1 and AW3 for clarity).

Resolution: Grantee had previously complied.

Section 3 Project Description

- (1) Page 3-4, 3.0 – The term “dual lane track” is not a typical transit term (more appropriate for highways); suggest using “double track”.

Resolution: Grantee had previously complied.

- (2) Page 3-4, 3.0 – There is no statement as to the number of vehicles being procured for the initial system.

Resolution: Grantee had previously complied.

- (3) Page 3-4, 3.1.1 Planned Extensions – Suggest standardizing on capitalization of “System” vs. “system” to differentiate from the entire project versus a system element.

Resolution: Grantee has generally complied.

- (4) Page 3-4, 3.1.1 Planned Extensions and Page 3-5, 3.1.2 Potential Future Extensions – Both sections describe future extensions and it is stated that they are not part of this RFMP update. However, the distinction between the two is not clear; aren't all of these potential expansions and extensions? Is the distinction

that some are in planning and some are just ideas? Perhaps, these sections could be combined?

Resolution: Grantee had previously explained satisfactorily.

- (5) Page 3-5, 3.2 Stations – Use of platform screen doors should be explained. What is the impact on vehicles and vehicle operation?

Resolution: Grantee had previously complied.

- (6) Page 3-6, Table 3-1, Vehicle Key Parameters – Please confirm that parameters listed in the table are of the actual vehicle proposed by the selected CSC contractor; if not update the table as appropriate to provide actual vehicle parameters.

Resolution: Grantee had previously complied.

- (7) Page 3-7, 3.5 Service Hours and Headways – Please confirm that Service Hours and Headways description is of the actual operations plan proposed by the selected CSC contractor; if not update it as appropriate.

Resolution: Grantee had previously explained satisfactorily.

- (8) Page 3-8, 3.5 2nd paragraph – What is the basis for the statement: “Choices in service headways are guided by the fact that more frequent service has a greater influence on patronage than other operating strategies (such as less frequent headways with longer trains)”? Must be clarified.

Resolution: Grantee had previously complied.

Section 4 Demand for Revenue Vehicles

- (1) Page 4-9, 4.1 Fleet Size, Step One – Peak Passenger Demand –
- Explain what is meant by “iterative process”.
 - Please identify the specific “travel demand forecasting model”.
 - Explain “Travel Demand Forecasting Model Boards Reports”.
 - Table 4-1, AM Peak hour travel demand Forecast – Suggest adding PM Peak Hour travel demand forecast for a ready reference and confirmation that AM peak (East) would be the driving demand for service. Also, reference how many hours in the peak period were used.

Resolution: Grantee had previously complied.

- (2) Page 4-9, Table 4-1, AM Peak Hour Travel Demand Forecast – It should be noted that Section 3.5 Service Hours and Headways shown on Page 3-8 mention 4.5 minute headways in 2019, which would yield only 4,240 pphpd with two car trains versus 6,429 pphpd. Please clarify the discrepancy.

Resolution: Grantee had previously complied.

- (3) Page 4-9, 4.1 Fleet Size, Step Two – Passenger Loading Standard – Is Comfort Loading of 159 passengers (32 seated + 127 standees) a new load standard, different from AW 2 load of 191 passengers (32 seated + 159 standees)? Please clarify and explain how this standard was developed for this new start system.

Resolution: Grantee had previously complied.

- (4) Page 4-9, 4.1 Fleet Size, Step Three – Run Time –
- a) Page 4-9 – Please identify the simulation data/methodology model.
 - b) Page 4-10 – Table 4-2, Round Trip Times – Explain / confirm how round trip times for the headways and throughput can be maintained with vehicle performance, dwell times, passenger loading, ATC safe train separation and guideway configuration as specified for a driverless automated system.
 - c) Page 4-10, 3rd bullet – Explain the reference to TP-3.4.2.3 at least in summation form.
 - d) Page 4-10, 4th bullet – Explain the specific “design passenger loading standard” used for this estimate.

Resolution: Grantee had previously complied.

- (5) Page 4-10, 4.1 Fleet Size, Step Four – Applying the Passenger Loading Standard
- a) Clarify “Table 4-3 applies Passenger loading standards to the peak demand...”- if it is the Comfort Load standard, then it should be so stated.
 - b) Clarify “...to meet passenger demands”; if it is “pphpd” as stated in Table 4-3, then this should be clarified in the body of the plan.

Resolution: Grantee had previously explained satisfactorily and complied.

- (6) Page 4-11, 4.1 Fleet Size, Step Five – Operating Fleet Requirement, Table 4-4, Minimum Peak Trains required –It is stated that 30 trains will be needed for Full Service Period (in 2019) to maintain 3 minute headways. Explain how this equates to the passenger capacity as shown in Table 4-5, System Passenger Capacity and in Table 3-3, Service Hours and Headways. While these calculations appear to be correct, there is a disconnect between the data shown.

Resolution: Grantee had previously complied.

- (7) Page 4-13, 4.1 Fleet Size: Step Six – grantee may want to consider gap trains as a viable option for operation between heavy boarding stations in the peak period; especially as an automated system, dependent upon location of yard access to the mainline and location of pocket storage tracks.

Resolution: Grantee had previously explained satisfactorily and has complied.

- (8) Page 4-13, 4.1 Fleet Size: Step Seven – Spare Ratio – Explain the basis for the statement “The Project has required an initial spare vehicle ratio of 15% of the operating fleet.” This proposed OSR is low and of concern.
- (9) While it is recognized that there is no operating experience for the system, an analytical methodology or logic can be used to come up with the number of spare vehicles for repairs, inspections, overhauls, major damage, etc. Additionally, the analysis could also take into consideration spares ratio history from other systems such as Vancouver Skytrain or in Denmark with similar vehicle proposed for Honolulu.

Resolution: Grantee had previously explained satisfactorily and has complied.

- (10) Page 4-13, 4.1 Fleet Size: Step Seven – Spare Ratio – The statement on second line “...those additional vehicles above the peak operating fleet that are used to replace failed operating vehicles or...” is indicative of gap or reserve vehicles, not of spare vehicles; their number should be identified in Step Six Gap Trains.

Resolution: Grantee had previously explained satisfactorily and has complied.

- (11) Page 4-13, 4.1 Fleet Size: Step Eight – Total Fleet Demand – Per CSC, 80 vehicles are being procured through 2019 (though not stated in this RFMP); and based upon the demand forecast information provided in Table 4-7, it would appear that the spare ratio in 2019 will be 25% or 22.5% (dependent upon whether the reserve train is included in the PVR). Please explain.

Resolution: Grantee had previously complied.

- (12) Page 4-13, 4.1 Fleet Size: Step Eight – Total Fleet Demand, Table 4-7 –As a minimum, two separate rows should be added, between Row 2 Total Peak Vehicles & Row 3 Total Fleet Size, to show the breakdown of maintenance spares and gap or reserve cars.

Resolution: Grantee had previously complied.

- (13) Page 4-13, 4.1 Fleet Size: Step Eight – Total Fleet Demand – Per CSC, 80 vehicles are being procured (though not stated in this RFMP); however, Table 4-7 shows 86 vehicles will be required in 2028; and based on Total Fleet Demand, six additional vehicles would need to be procured by approximately 2025. What mechanism exists or is planned for the purchase of six of these “one of a kind” vehicles, which could be quite expensive for low quantity procurement.

Resolution: Grantee had previously revised the time frame and has complied.

- (14) Page 4-13, 4.2 Procurement

- a) First paragraph – Provide details in reference to “Core Systems Request for Proposal (BAFO #2)” with summary information for the vehicles (and for operations and maintenance); it could be provided in an appendix.
- b) Second paragraph – Shouldn’t “(...one spare train for all operating scenarios)” be included as part of the gap or reserve train and account for the PVR, rather than OSR?
- c) Second paragraph – It is stated in 4th paragraph that mileage per vehicle will be 500,000 miles in five years – or 100,000 miles per year. Explain how the “average annual mileage to be minimized”.
- d) Fourth paragraph – This paragraph would seem more appropriate to be included in the next section titled “5 Maintenance Plan”.

Resolution: Grantee had previously explained satisfactorily and has complied.

Section 5 Maintenance Plan

- (1) Page 5-1– A staffing plan or organization chart should be included showing how CSC will perform maintenance, and what oversight will exist for grantee over CSC.

Resolution: Grantee has included a draft organization chart in this update and has complied.

- (2) Page 5-1– There is no mention or description of any system for the management of maintenance elements such as work orders; data collection and analysis; tracking of reliability, mean-time-to-repair, mean-time-between-failures; parts inventory; training; manuals; or other support functions. If they are addressed in the CSC proposal, as a minimum, they should be referenced in the RFMP and summary information could be provided in an appendix.

Resolution: Grantee has only partially addressed and should expand in the next update; RFMP narrative acceptable at this time.

- (3) Page 5-1, 5.1 Train Failure Definitions
 - a) Third line – Explain what will determine “extraordinary circumstances” and distinguish these from “critical safety failures”; and how these are identified utilizing CSC’s O&M contract with grantee oversight.
 - b) Item 3 – Clarify “parted train detection”.
 - c) It is readily apparent that safety seems to be a determining factor in handling train failures as stated. Provide a brief explanation of the relationship of grantee with the CSC, including safety certification and safety oversight issues.

Resolution: Grantee had previously complied.

- (4) Page 5-2, 5.2 Maintenance Strategy –This section appears to deal with unscheduled maintenance or in-service failures. While the maintenance levels

identified are commendable, explain how this will be implemented through the CSC O&M contract.

Resolution: Grantee has only partially addressed this comment; additional detail should be provided as policies and practices are developed in cooperation with the CSC and should be included in the next update; RFMP narrative is acceptable at this time.

- (5) Page 5-4, 5.3 Preventive Maintenance –Periodic and Mileage Based –This section will require considerable more detail and expansion as the CSC is awarded and vehicle design progresses.

Resolution: Grantee has complied but additional detail should be provided as policies and practices are developed in cooperation with the CSC and should be included in the next update; RFMP narrative is acceptable at this time.

- (6) Page 5-4, 5.3 Preventive Maintenance –Light and Heavy Overhauls –
- a) The expected life of the vehicles should be stated and the number of overhauls to be performed, including the time it will take for a vehicle to undergo an overhaul. This would require some vehicles to be out of service, which should be reflected in the PVR and OSR.
 - b) Page 5-4, Table 5-2 Preliminary Overhaul Plan –Non-vehicle action items are best removed from this table for purposes of the RFMP; and this table may best be suited for an appendix. Also, “Full O&M Period” and “Optional O&M Period” should be defined.

Resolution: Grantee had previously explained satisfactorily and has complied.

- (7) Page 5-8, 5.3 Preventive Maintenance – Other Subsystems –This section will need significant expansion as vehicle design progresses.

Resolution: Grantee should include in the next update; RFMP narrative is acceptable at this time.

- (8) Page 5-8, 5.4 Service Mode and Reliability Measures –This section should be expanded to incorporate performance monitoring summary from the CSC O&M specifications. A summary of data monitoring including a Maintenance Management Information System (MMIS) should also be addressed here.

Resolution: Grantee should include in the next update; RFMP narrative is acceptable at this time.

Section 6 Rail Vehicle Maintenance Facility

- (1) Page 6-1, 6.1 Functional Areas
- a) State the storage yard capacity. Also, describe shop details such as pits, lifts, wheel truing equipment, wheel presses, overhead cranes, machine shops,

electronic repair, parts storage, etc.; and shop capacity for PMs, overhauls, cleaning, inspections, etc. If the shop is still under design, it should be so stated and some design criteria or minimums should be included.

- b) Describe the functions and manpower that will be stationed in the maintenance facility, including the capacity of locker rooms, office areas, parking lots, etc.

Resolution: Grantee had previously explained satisfactorily and has complied.

(2) Page 6-4, 6.2 MSF Vehicle Capacity

- a) It appears that the yard capacity is 56 vehicles, while the procurement in CSC is for 80 vehicles. Explain how the remaining 24 vehicles will be stored in non-revenue hours without impeding movement in the MSF.
- b) Storage on access tracks to the shop will hamper vehicle movement, even in an automated yard. Clarify if the access tracks will also be automated.
- c) Typically, maintenance tracks are not considered as part of the fleet storage capacity; explain what will be the philosophy or policy in this MSF.

Resolution: Grantee had previously explained satisfactorily and has complied.

5.0 CONCLUSION

The PMOC had conducted a review of grantee's initial Rail Fleet Management Plan (RFMP) draft dated April 2011 to assess compliance with appropriate FTA Guidance and followed up with another review of the July 13, 2011 red-lined RFMP update. Since PMOC's earlier reviews of the RFMP, this report addresses PMOC's review of the most current red-lined RFMP Rev 01, March 2012 update provided by the grantee.

The PMOC reviewed this red-lined RFMP document to assess compliance with appropriate FTA Guidance and found the document generally followed FTA's 8-step process for Operations Spare Ratio (OSR) computation. The PMOC noted that grantee has complied with OP 37 guidance, the majority of the PMOC previous comments have been satisfactorily addressed, and that grantee has agreed to update the remaining open items in the next revision of the RFMP. Our responses in this report are primarily to enhance the RFMP as it progresses through the construction phase. It will then require additional details to ensure collection of needed data or monitoring of the defined processes.

Through the CSC, the grantee is procuring 80 new "light" heavy rail vehicles to provide service through 2024; and the CSC Operations and Maintenance portion of the contract defines activities related to service operations, planned management & maintenance of the fleet, and also provides substantial information regarding service demand.

The PMOC anticipates that the next revision of the RFMP would be available after the FFGA when the Core Systems Contractor begins its work in earnest (i.e. within one year of initial Notice to Proceed). That revision should address and/or provide additional detail on the following topics:

- Service operations and vehicle demand forecasting
- Planned fleet Maintenance practices and management staffing that will be provided through CSC
- Planned use of Maintenance Statistics and Maintenance Strategy as provided through the CSC
- MSF functionality and vehicle availability

In addition to providing additional detail in the areas noted above, the grantee should address, in the next update of the RFMP, PMOC's comments as annotated in this report as well as those in "Appendix B:OP 37, Appendix B FMP Checklist – Grantee Compliance" of the PMOC's report.

In conclusion, this red-lined draft RFMP (Rev.01 dated March 2012) complies with the FTA guidance. The PMOC would recommend that this RFMP update be accepted as a deliverable for the FFGA application.

The PMOC also recommends that a workshop be conducted with the grantee to discuss the details needed in the next update of the RFMP to ensure compliance during implementation of the Project.

APPENDICES

Appendix A: Acronym List

APTA	▪	American Public Transportation Association
ATC	▪	Automatic Train Control
AWO	▪	Empty Transit Vehicle Weight (Ready to run – in pounds)
AW1	▪	Empty Transit Vehicle Weight plus passenger seated load
AW2	▪	Empty Transit Vehicle Weight plus passenger seated and normal rated standing load
AW3	▪	Empty Transit Vehicle Weight plus passenger seated and full rated standing load
CFR	▪	Code of Federal Regulations
CSC	▪	Core Systems Contract
DB	▪	Design-Build
DBOM	▪	Design-Build-Operate-Maintain
DCS	▪	Fire/Life Safety Committee
FD	▪	Final Design
FFGA	▪	Full Funding Grant Agreement
FRA	▪	Federal Railroad Administration
FTA	▪	Federal Transit Administration
GEC	▪	General Engineering Consultant
MDBF	▪	Mean Distance Between Failure
MOW	▪	Maintenance of Way
MPH	▪	Miles Per Hour
MSF	▪	Maintenance & Storage Facility
MTTR	▪	Mean Time To Repair
O&M	▪	Operations and Maintenance
OP	▪	Oversight Procedure
OSR	▪	Operating Spare Ratio
PE	▪	Preliminary Engineering
PMOC	▪	Project Management Oversight Consultant
PVR	▪	Peak Vehicle Requirement
QA	▪	Quality Assurance
QC	▪	Quality Control
RFMP	▪	Rail Fleet Management Plan
ROW	▪	Right of Way
TOC	▪	Table of Contents
US/U.S.	▪	United States

Appendix B: OP 37, Appendix B FMP Checklist – Grantee Compliance

	Requirement	PMOC Review Comments
		Review comments will indicate the following: Acceptable, Unacceptable, Acceptable with comment. Identify portions of the document that meet the criteria
1	Grantee Document	
1A	<i>The FMP is conformed in accordance with the grantee's Document Control System.</i>	Acceptable
1B	<i>Each page identifies the Revision No. and the date of the document.</i>	Acceptable
1C	<i>The date of the grantee's submittal is clearly identified.</i>	Acceptable.
1D	<i>The contents of the FMP properly reflect the Table of Contents.</i>	Acceptable
2	PMOC review of Grantee's fleet description	
	<i>Verify description of the makeup of the present fleet, including:</i>	
2A	<i>The number and type of vehicles in service</i>	Not Applicable – New Start.
2B	<i>Peak vehicle requirements (service period and make-up, e.g., standby vehicles)</i>	Acceptable – Section 4.1 Fleet Size.
2C	<i>Address the spare ratio of vehicles, and the rationale underlying that spare ratio</i>	Acceptable – Section 4.1.
2D	<i>Achieve optimal life expectancies</i>	Not applicable – New Start.
2E	<i>Details of existing and planned vehicle procurements</i>	Acceptable – Section 3.4.
2F	<i>Current and future equipment needs</i>	Acceptable – Section 4.1.
2G	<i>Grantee in its selection and specification of vehicle equipment and systems has matched appropriate technology with the planned transit applications for best performance at the lowest cost.</i>	Acceptable – Validation of this requirement has been done for compliance with OP 38, through PMOC's review and report.
3	PMOC review of Grantee's Operations and Maintenance strategy	
	<i>Verify that the Operations and Maintenance Strategy addresses:</i>	
3A	<i>Operating policies and conditions (level of service requirements, vehicle failure definitions and actions)</i>	Acceptable at this time – Some information is provided in Section 5; additional detail commensurate with the Project progress to be provided in future updates.
3B	<i>In detail the composition of facilities</i>	Acceptable – Section 6.
3C	<i>Any rebuilds that extend the life expectancy of the equipment, any overhaul/rebuild programs; schedule to complete, effects on vehicle availability and useful life, etc., to the fleet</i>	Acceptable at this time – Strategy is provided in Section 5; additional detail commensurate with the Project progress to be provided in future updates.
3D	<i>The grantee has adequately defined the preventive maintenance and schedule established for the existing and procured/overhauled vehicle fleet</i>	Acceptable at this time – Strategy is provided in Section 5; additional detail commensurate with the Project progress to be provided in future updates.
3E	<i>Enable a transit operator to properly plan for and carry out the overall management of its entire fleet of vehicle</i>	Acceptable at this time – Basic information is provided in Section 5; additional detail commensurate with the Project progress to be provided in future updates.

	Requirement	PMOC Review Comments
3F	<i>Fleet operations (present and future) as described in the plan are substantially consistent with that adopted in the Record of Decision (if applicable)</i>	Not Applicable – Record of Decision does not address details of fleet operations required in RFMP
4	PMOC review of Grantee's Management Capabilities	
	<i>Verify that the grantee's management is competent and capable of providing leadership and direction on matters of:</i>	Acceptable at this time – Section 5 Maintenance Plan. Additional oversight detail commensurate with the Project progress to be provided in future updates.
4A	<i>The requirements for peak and spare vehicles including schedule spares, maintenance spares, parts spares</i>	Acceptable – Section 4 Demand for Revenue Vehicles.
4B	<i>The requirements for support functions such as heavy maintenance, capital and operating parts inventory and information technology</i>	Acceptable at this time – Section 5 Maintenance Plan. Additional detail commensurate with the Project progress to be provided in future updates.
4C	<i>Strategies for acquisition of new vehicles or overhauling existing equipment and tradeoffs between them</i>	Not Applicable – New Start.
4D	<i>Strategies for maintenance and operations including reducing spare vehicles</i>	Acceptable at this time – Section 5 Maintenance Plan. Additional detail commensurate with the Project progress to be provided in future updates.
4E	<i>Strategies for reducing operating costs and increasing service reliability.</i>	Not Applicable – Since this is a New Start project, there is no operational history.
4F	<i>The plan discusses the grantee's reliability program, past performance and plans to improve reliability including profile monitoring and support of maintenance as well as failure rates and vehicles out-of-service as well as providing vehicle failure definitions and actions</i>	Acceptable at this time – Section 5 Maintenance Plan. Additional detail commensurate with the Project progress to be provided in future updates.
4G	<i>Grantee keeps a copy on file for review upon request updated from time to time as changes occur within the transit agency, acquisitions, replacement, rebuild/rehab, changes in headway or level of service, etc.</i>	Not Applicable – This is a New Starts Project, and there are no updates / changes to acquisitions, replacement, rebuilds / rehabs, headway or level of service, etc.
4H	<i>Sufficiently complete in detail and analysis (Fleet plan or supporting documentation) to readily demonstrate (1) grantee's ability to maintain and consistently improve the current level, operating costs, reliability and quality of revenue service for the years leading up to and following construction of the project; (the plan also provides.)</i>	Acceptable at this time – Additional detail for contract operations & maintenance commensurate with the Project progress to be provided in future updates.
4I	<i>The grantee's information system reliably provides needed operating and financial data such as current estimates of vehicle operating costs, reliability and life expectancy, for decision-making and performance review.</i>	Acceptable at this time – Additional detail for contract operations & maintenance commensurate with the Project progress to be provided in future updates.
4J	<i>The plan defines system and service expansions.</i>	Acceptable
5	Project Impact Assessment	
	<i>Verify that critical system elements receive comprehensive assessment:</i>	

	Requirement	PMOC Review Comments
5A	<i>The grantee's existing transit service in terms of level of service, operating costs, reliability, quality and support functions, will not be degraded as a consequence of the design and either the manufacture of the equipment, or construction of the project</i>	Acceptable – Grantee's existing transit service is via bus; and upon review of the RFMP, it is PMOC's opinion that grantee's existing transit service will not be degraded "in terms of level of service and reliability".
5B	<i>The grantee will be able to provide adequate service to meet the transit demand for the years leading up to and following either the delivery of the equipment/facility or construction of the project</i>	Acceptable at this time – Some information is provided; additional detail commensurate with the Project progress to be provided in future updates once AHJV provides more detailed input on RFMP to substantiate that the grantee "will be able to provide adequate service to meet the transit demand for the years leading up to <u>and following</u> " the design and construction of this project.
5C	<i>The grantee can properly plan for and execute the overall management of its entire fleet of vehicles and related support functions and equipment, addressing all the reasonably foreseeable factors that are relevant to the determination of current and future equipment needs in light of demand for service</i>	Acceptable at this time – Some information is provided; additional detail commensurate with the Project progress to be provided in future update to substantiate that the grantee "can properly plan for and execute the overall management of its entire fleet of vehicles and related support functions and equipment" for the years leading up to and following the design and construction of the project.
5D	<i>Grantee estimates of costs, service levels, quality, or reliability are mechanically correct and complete, consistent with the grantee-defined methodologies and free of any material inaccuracies or incomplete data.</i>	Acceptable at this time – Some information is provided; additional detail of grantee's estimates of costs, quality, reliability, etc. commensurate with the Project progress to be provided in future updates.
5E	<i>Grantee forecasts and schedule are also mechanically correct and complete, consistent with the plan scope and project scope adopted in the Record of Decision (if applicable) and the proposed Revenue Operations Date as well as free of any material inaccuracies or incomplete data.</i>	Acceptable at this time – Some information is provided; additional detail of grantee's schedule commensurate with the Project progress to be provided in future updates once AHJV provides more detailed input on RFMP.
6	PMOC's review of Grantee's Operations and Maintenance Plan Format	
	<i>Verify that the plan is consistent with FTA's guidance specifically with respect to:</i>	
6A	<i>Definition of terms</i>	Acceptable – Section 2.
6B	<i>Description of existing system and expansion plans, both project and non-project related</i>	Acceptable
6C	<i>The Demand for Revenue Vehicles and Operating Spare Ratio have been calculated in conformance with FTA guidance</i>	Acceptable – Section 4.
6D	<i>The grantee has selected a sufficient time frame, (a minimum of 10 to 15 years) and compiled sufficient historical and empirical data from past and current fleet operations</i>	Acceptable

Appendix C: OP 37, Appendix C FMP Table of Contents – Grantee Compliance

Sample Fleet Management Plan Table of Contents	In AA and/or Requesting Entry to PE	In PE, Advanced PE, and/or Requesting entry to FD	In FD and/or Requesting FFGA	In Bid / Award and / or Construction	Grantee Compliance
Introduction	●	○	○	○	✓
Overview of Plan	●	○	○		✓
Plan Timeframe	●	○	○		✓
Definition of Terms	●	○	○	○	✓
Existing System	●	○	○	○	✓
Description of current system	●	○	○	○	✓
Inventory List	▲	○	○	○	N/A
Expansion Plan	▲	●	○	○	✓
Demand for Revenue Vehicles	▲	●	○	○	✓
Peak Passenger Demand	▲	●	○	○	✓
Passenger Load Standards	▲	●	○	○	✓
Vehicle Run Times	▲	●	○	○	✓
Peak Vehicle Calculations	▲	●	○	○	✓
Gap or Ready reserve vehicles	▲	●	○	○	✓
Spare Vehicle Calculation	▲	●	○	○	✓
Total Sum of Vehicles required out of service	▲	●	○	○	✓
Supply of Revenue Vehicles	▲	●	○	○	✓
Reconciliation of Demand vs. Supply	▲	●	○	○	✓
Existing and planned fleet procurements	▲	●	○	○	✓
Define overhaul / rebuild programs	▲	●	○	○	✓
Rebuild Schedules	▲	●	○	○	✓
Vehicle Availability	▲	●	○	○	✓
Useful Life	▲	●	○	○	✓
Maintenance and Reliability	▲	●	○	○	✓
Preventative Maintenance Program	▲	●	○	○	✓
Fleet Failure Rates	▲	●	○	○	N/A
Revenue Vehicle Demand/Supply Balance	▲	●	○	○	✓
Comparison of Vehicle Demand and Supply for duration of plan	▲	●	○	○	✓

NOTE: ▲ – Preliminary information required; ● – Element to be completed; ○ – Element to be modified or augmented with additional information as necessary.