

**AMENDMENT NO. 2**  
**ATTACHMENT NO. 1**

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**2. TP-1: Core Systems Description, TP-1.5 Operation & Maintenance:**

**“TP-1.5 OPERATION & MAINTENANCE**

The Core Systems Contractor shall operate and maintain the System consistent with the Operation and Maintenance Plan, commencing with initiation of passenger operations on the initial segment and continuing during the period of interim openings through completion of construction of the First Project and for a specified period thereafter. The Core Systems Contractor is responsible for detailed operations and maintenance planning to determine the necessary staffing levels for OCC staff, maintenance staff, administrative staff, security staff, and any roving personnel that may be needed. Train attendants and station attendants shall be provided in accordance with Section TP-3. Security staff (as set out in MP 2), fare inspection staff, and landscaping staff will be provided by the City, except for security staff and landscaping staff provided and managed by the Core Systems Contractor for the MSF and TPSS sites and rooms/buildings that house system equipment. The City will be responsible for revenue collection.”

**3. TP-2: Verification Test and Acceptance, Table of Contents:**

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#### 4. TP-2: Verification Test and Acceptance, TP-2.2.2.1 VTA Program Outline, Paragraph 1 and 2:

“The Core Systems Contractor shall prepare the VTA Program in a building block manner identifying all design and performance requirements (also known as the “System Final Definition”). This will

include assigning the requirements to the appropriate verification efforts (e.g., component or assembly development, subsystem/subassembly qualification or acceptance, electromagnetic interference/compatibility, installation, combined subsystem, system acceptance, or initial operations). In addition the Core System Contractor shall define the methods to be used to accomplish verification (e.g., test, analysis, similarity to an equivalent application, simulation, or in the case of dimensional or cosmetic requirements, inspection).

Exhibit A provides Electromagnetic Interface (EMI) and Electromagnetic Compatibility (EMC) requirements. As part of the VTA Plan the Core Systems Contractor shall develop an EMI Control Plan for Passenger Vehicles, Traction Electrification System, Train Control System, Communications System and platform screen automatic gate system.”

**5. TP-2: Verification Test and Acceptance, TP 2.6.1.1 Definitions**

**“TP 2.6.1.1 Definitions**

Definitions used in this TP Section 2.6.1 are as follows:

Major subsystems -- Those subsystems that comprise the most important functional elements of the system provided by the Core Systems Contractor. For the purposes of this TP Section 2.6.1, the major subsystems are:

- A. Vehicles – Refer to TP Section 4.
- B. Power distribution – Refer to TP Section 8.
- C. Automatic train control (incl. platform screen gate system interface) – Refer to TP Section 6 and 8.
- D. Communications – Refer to TP Sections 6 and 8.
- E. Fare Vending – Refer to TP Section 5.”

**6. TP-2: Verification Test and Acceptance, TP 2.7.6 Station and Equipment (to be modified to Station and Platform Screen Automatic Gate Equipment):**

**“TP-2.7.6 Station and Platform Screen Automatic Gate Equipment**

The Core Systems Contractor shall inspect and check the installation and operation of all station and platform screen automatic gate equipment against approved installation drawings and instructions. All equipment shall be energized and the control and operation shall be operated from associated local control panels and from OCC.”

**7. TP-2: Verification Test and Acceptance, Exhibit B - Verification, Test and Acceptance, Section 8.**

“8. Platform Screen Automatic Gate System.

First Article Inspection  
Functional Test  
Environmental Test  
Maintainability Test  
Equipment/Systems Interface Test  
90-Day In-Service Test”

**8. TP-3 Operations & Maintenance Performance Requirements**

**Operations & Maintenance  
Performance Requirements  
Honolulu Rail Transit Project**

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**TP-3 OPERATIONS & MAINTENANCE PERFORMANCE REQUIREMENTS**

This Operations & Maintenance (O&M) performance-based document contains the Technical Requirements of the O&M Work for the System. The Core Systems Contractor shall perform all O&M Work set forth herein. This provision covers the O&M planning and execution requirements. The System is planned to open in an incremental (phased) fashion moving west to east along the alignment.

Refer to TP-1, "Core Systems Description" as well as the balance of the technical requirements of the Core Systems Contract.

### **TP-3.1 O&M PERIODS**

#### **TP-3.1.1 O&M Work Schedule**

O&M Work shall take place during the following defined periods:

- O&M PLANNING AND DESIGN SUPPORT PERIOD commencing at the Contract's Notice-To-Proceed (NTP) through completion of planning and design activities in preparation for the Full O&M Period;
- O&M MOBILIZATION PERIOD commencing at least six (6) months prior to the start of the Intermediate O&M Period, and ending at the start of the Full O&M Period;
- INTERMEDIATE O&M PERIOD commencing on the date set forth in Section SP-4.1, and ending at the start of the Full O&M Period;
- FULL O&M PERIOD commencing on the earlier of the date set forth in Section SP-4.1 and the date that the operating segment between the East Kapolei and Ala Moana stations is placed into passenger service; and ending on the date that is 10 years following the date of commencement of Intermediate O&M Period 1; and
- OPTIONAL O&M PERIOD, if exercised by the City, commencing at the end of the Full O&M Period and continuing through the Contract term.

The Core Systems Contractor's staff shall be of an appropriate size and qualification to support the O&M periods described in detail herein.

#### **TP-3.1.2 O&M Planning and Design Support Period**

During the O&M Planning and Design Support Period, which begins at the Contract's NTP, the Core Systems Contractor's staff shall conduct operability and maintainability reviews; prepare O&M plans, rule books, and procedures; and provide related O&M support work during the design and construction phases of the project.

#### **TP-3.1.3 O&M Mobilization Period**

The O&M Mobilization Period shall be fully established by the Core Systems Contractor at least six (6) months prior to the start of the Intermediate O&M Period described herein. The Core Systems Contractor shall determine the appropriate staff, equipment and materials necessary to support the operations and maintenance activities during this period. The O&M Mobilization Period shall be coordinated with the Staffing Plans and overall operation and maintenance management plans required within these Management and Technical Provisions. Passenger service for any of the operating segments cannot commence without trained operating and testing personnel having been qualified or certified, depending upon the position, in accordance with the Core Systems Contractor's training plan accepted by HART.

The Core Systems Contractor shall prepare an O&M Mobilization Plan that reflects the operating segments and related turnover dates occurring throughout the Contract term, and include all the necessary elements to be undertaken during said period to ready the System and O&M personnel for launch into passenger service, such as the establishment of a regulated FTA Drug and Alcohol Testing Program, training programs, and the development of other related plans, programs, and procedures. O&M Mobilization Plans shall be created for each transition to a new operating period and shall reflect experience gained and lessons learned from previous mobilizations. The following steps shall be completed by the Core Systems Contractor and will form the pre-requisites for transitioning each non-revenue service segment from the Design Build Phase to the Operations and Maintenance Phases of the Project:

- A.** System Final Definition (refer to TP-2, "Verification Test and Acceptance", 2.2.2.1, VTA Program Outline).
- B.** Integrated System Demonstration Testing (refer to TP-2, "Verification Test and Acceptance", 2.8, Integrated System Demonstration Plan).
- C.** Acceptance of the operating segment (refer to TP-2, "Verification Test and Acceptance", 2.9.3, Operating System Acceptance Plan).
- D.** Safety Certification of the Design Build Phase of the Project (refer to Design Criteria Chapters 23 and 25).

Successful completion of the 30-day demonstration of the System operation in accordance with Section 3.3.6.1.

After successful completion of items A through E and HART issuance of the Certificate of Substantial Completion the operating segment can be transitioned to the Operation and Maintenance Phase. The following steps shall be completed by the Core Systems Contractor and will form the pre-requisites for placing an operating segment into passenger service:

- E.** Operating Rule Book (refer to Section 3.2.6, Rule Book).
- F.** Emergency Preparedness Plan (refer to Section 3.2.10, Emergency Plan).
- G.** Training Program (refer to Section 3.2.7, Training Plan and Program).
- H.** Maintenance Plan (refer to Section 3.2.2, Maintenance Plan).
- I.** Emergency Drills (refer to Section 3.2.10, Emergency Plan).
- J.** Pre-passenger service training of the O&M personnel (refer to Section 3.4.12.4, Testing of Maintenance Personnel).
- K.** Safety Certification of the Operations and Maintenance Phase for an operating segment (refer to Section 3.2.9, Safety and Security Programs).
- L.** Operations and Maintenance Management Plan (refer to Section 3.2.3)



- M. System Operations Plan (refer to Section 3.2.1).
- N. System Safety Program Plan (refer to Section 3.2.9.3).
- O. System Security Program Plan (refer to Section 3.2.9.5).
- P. O&M Mobilization Period Plan (refer to Section 3.2.12).
- Q. System Assurance Monitoring Plan (refer to Section 3.2.8)
- R. Operating Manuals (refer to Section 3.2.4)
- S. Maintenance Manuals (refer to Section 3.2.5)

After successful completion of items A through S the operating segment can be placed into passenger service. It shall be noted that integrated system demonstration testing, certifying that the system is safe for passenger service, and strict adherence to procedures concerning rail operations and the related handovers between construction and operations shall be key elements to this process.

**TP-3.1.4 Not Used**

**TP-3.1.5 Intermediate O&M Period**

The Intermediate O&M Period commences on the date set forth in Section SP-4.1 and ends at the start of the Full O&M Period. The Intermediate O&M Period consists of a number of defined operating periods associated with progressively expanded System segments that become ready for passenger service. The intermediate periods are described generally as follows:

- A. INTERMEDIATE O&M PERIOD 1 commences on the date set forth in Section SP-4.1 when the operating segment between the East Kapolei and Aloha Stadium stations is placed into passenger service, and ends at the start of Intermediate O&M Period #2.
- B. INTERMEDIATE O&M PERIOD 2 commences on the date set forth in Section SP-4.1 when the operating segment between the East Kapolei and Middle Street Transit Center stations is placed into passenger service, and ends at the start of the Full O&M Period.

The transition from one O&M period to another shall minimize the impact on the service provided to the current O&M period. Impacts shall be discussed and approved by the City prior to commencing the next O&M period.

**TP-3 .1.6 Not Used**

**TP-3.1.7 Optional O&M Period**

The Optional O&M Period, if exercised by the City, commences at the end of the Full O&M Period, and continues for a period of 39 (thirty-nine) months through the end of the Contract term. The Optional O&M Period will be composed of the operating segment between the East Kapolei and Ala Moana Center stations for the full 20-hour operating day.

## **TP-3.2 SYSTEM OPERATING DOCUMENTATION**

### **TP-3.2.1 System Operations Plan**

The Core Systems Contractor shall prepare and submit for HART's review and acceptance a System Operations Plan to maximize system availability and safety and to minimize operating costs. The Plan shall reflect the Core Systems Contractor's specific equipment requirements and shall include a comprehensive description of operating strategies and general procedures.

The System Operations Plan shall include separate operating plans for weekdays, weekends, specific holidays, and any conditions that are unique to the System. Each shall include a schedule of operations over the entire operating day for each section of the System for which there is a difference in the operations. Each schedule of operations shall include the following information as a minimum:

- Number of trains to be operated
- Number of round trips scheduled for each train
- Headways to be operated
- Line capacity to be provided in each direction
- Vehicle-miles scheduled to be operated per time period and per day
- Vehicle-hours scheduled to be operated per time period and per day
- Train-hours scheduled to be operated per time period and per day
- Energy consumption for each time period, per day and per year

In addition, the System Operations Plan shall include:

- Nature and frequency of routine operations
- Methods to adjust for changing conditions, such as passenger demand, weather and special events.
- Explanation of methods of handling malfunctions, failures, emergencies, and other downtime events, including the transport of disabled passengers among stations when station vertical circulation equipment is out of service.
- Basic procedures for attended and unattended passenger evacuations during System failures, failure management procedures, and safety procedures for each of these conditions.
- Methods and procedures for keeping all operating records, including those required in the System Assurance Monitoring Plan.

- Typical operations reports and information to be contained therein.

There shall be a one-to-one correspondence between the System Operations Plan and the other plans required by Section 3.2.

The System Operations Plan shall provide that the Central Control Consoles will be staffed at all times, 24 hours per day, seven days per week, by qualified personnel in a number and of such qualifications as accepted by HART.

### **TP-3.2.2 Maintenance Plan**

The System Maintenance Plan shall be developed and delivered to HART for its review and acceptance. This Plan shall be in accord and consistent with the System Operations Plan and sufficient to support the anticipated system operating hours, vehicle-hours, and vehicle-miles. The Maintenance Plan shall provide sufficient maintenance such that the equipment to be maintained by the Core Systems Contractor will reach its specified service lives, and such that the operational requirements and System Service Availability specified in this provision will be met.

The Maintenance Plan shall include the following as a minimum:

- A. A separate schedule for each major subsystem and facility of the routine cleaning, inspections, and maintenance and testing (i.e., Revenue vehicles, Support vehicles, power distribution, ATC, Communications, guideway, track, MSF including major support equipment, stations, Platform Screen Gate System, MSF, other support facilities, landscaping, ditches, drains and runoff capture ponds, parking lots and garages, access control, intermodal (bus, pedestrian, bicycle) areas, structures, parking lots and garages and other facilities and subsystems for which the Core Systems Contractor is responsible). Each schedule shall identify the nature and extent of scheduled Work, including facilities and necessary equipment for each scheduled preventive maintenance task, together with realistic estimates of the required staff-hours and skill levels. The frequency of and standards for cleaning the facilities, vehicles, and other equipment and properties of the System shall be defined.
- B. Separate listing of overhauls by major subsystem and plans for Capital Asset Replacements.
- C. Schedules for the accomplishment of the Work defined in (A) and (B) above by system hours, train-hours, vehicle-hours, or vehicle-miles (whichever is relevant) and shown weekly, monthly and yearly.
- D. Criteria, including scheduled frequency, for conducting departure and other tests.
- E. Lists and discussion of unscheduled maintenance and an estimate of the extent of such maintenance in accord with the system operating hours, train-hours, vehicle-hours and vehicle-miles.
- F. The approach to troubleshooting trains, vehicles, train control, communications, traction power, station, Platform Screen Gate System, wayside and operations control center equipment, including a description of any special test equipment and/or built-in test features provided for this purpose.

- G. Procedures which prevent equipment that has not fulfilled check-out requirements from being operated during passenger service.
- H. Specify maintenance records and reports and inventory control procedures, to include data, format, and frequency. These records, reports, and procedures shall be kept and produced using the Core Systems Contractor-provided, City-accepted, computer-based Maintenance Management Information System (MMIS). Other related information shall be provided by manual logging, analyses, and reporting processes.
- I. A separate MMIS Manual, to include a complete description of the MMIS. The MMIS shall include the functions/capabilities specified in MP-2. The MMIS shall be user friendly and shall be designed to operate using a graphical interface under Windows 10 or later type operating system available when it is first developed. The MMIS shall be IBM Maximo, or an equivalent "commercial off the shelf" maintenance management information system compatible with the City's Asset Management System with regards to transferring/ sharing asset management information, and acceptable to the City. Any updates or upgrades to the MMIS initiated by the Contractor or otherwise required under the Core Systems Contract during the O&M Periods will be done at the sole cost of the Core System Contractor.
- J. Procedures for maintaining an adequate inventory of spare parts and expendables and establishing necessary storage requirements for these items, including a description of the computerized purchasing and inventory system which is to be part of the MMIS.

**TP-3.2.3 Operations and Maintenance Management Plan**

The O&M Management Plan shall be consistent with the System Operations and Maintenance Plans and shall include at least the following:

- A. A description of the proposed Operations and Maintenance organization, including an organization chart.
- B. A complete staffing plan showing all positions by labor category, job function, and specific O&M work for both management and technical personnel. Operation and maintenance key management personnel are not required to be named; however, the qualifications for each key management personnel shall be defined and discussed.
- C. Position descriptions and qualifications for each category of employee listed in the staffing plan.
- D. Staffing schedules showing the number of which categories of employees are proposed to be on duty to carry out which functions and specific O&M work (e.g., operations, surveillance, maintenance, etc.) on a daily, weekly and monthly basis. Show each work shift separately.
- E. Listing of any proposed subcontracts, including the Work to be assigned to each.

**TP-3.2.4 Operating Manuals**

The Core Systems Contractor shall prepare a complete set of Operating Manuals covering the detailed operating procedures for all subsystems and components of the System.

One component of the System Operating Manuals shall be a Central Control Operations Manual which shall provide the Controllers the necessary operating instructions and procedures for each component and/or subsystem. The Central Control Operations Manual shall include detailed operation procedures for at least the following: each of the System operating modes, each of the conditions of start-up, shutdown, manual train operations, vehicle switching, mode changing, and all anticipated System operational situations and covered in the System Operations Plan. It shall contain a detailed description of the Central Control Consoles and their functional roles in System operation and the procedures for dealing with all anticipated normal and abnormal conditions. This Central Control Operations Manual shall also include detailed procedures to be followed for failure management and for emergency safety and security operations, including coordination with non-System personnel.

### **TP-3.2.5 Maintenance Manuals**

Maintenance Manuals shall be provided for all elements of the System. These manuals shall provide detailed procedures and reference data for performing all of the required maintenance tasks. The text and detail of these manuals shall be consistent with the Core Systems Contractor's proposed maintenance philosophy and the required maintenance personnel skill levels, facilities and equipment. The manuals shall include expanded assembly pictorials and complete instructions for assembly and disassembly as required. The Maintenance Manuals shall contain general information such as:

- Preventive maintenance and overhaul schedules for all System components.
- Descriptions of maintenance procedures of all System components.
- Description of interactions between major subsystem elements.
- Detailed descriptions of individual System components and assemblies including clearances, tolerances, circuit operations, test point voltages, waveforms, etc., with references to System drawings as applicable down to the lowest replaceable unit (LRU).
- Detailed descriptions of operational procedures for all manual operations.
- Detailed description of test equipment calibration, operations, and procedures for its correct use in equipment maintenance.
- Description of replacement parts, including identifying description and parts numbers as necessary to order such parts from the original parts supplier or manufacturer. There shall be a complete parts list for all numbered parts, correlating the parts numbers with the parts' names, and the names of the original manufacturer down to and including the LRU and identifying the LRU parts. Where an LRU is not a Core Systems Contractor specific design or product but is purchased from a vendor or subcontractor, the Original Equipment Manufacturer (OEM) shall be identified together with the OEM-specified part and/or model numbers and copies of the OEM maintenance instructions. The parts list shall be provided as part of the computerized

inventory control system, along with the software and hardware, for changing, updating, and sorting by any category or data field, and printing the results.

- Appropriate drawings, literature and other information which accompany LRUs purchased from other vendors. These may be provided as appendices to the manuals.
- Troubleshooting guides at the System, subsystems, and component equipment level to aid in diagnosis of common failure modes.

#### **TP-3.2.6 Rule Book**

Durable, pocket-size, rule books (6" x 4") shall be provided for use by all System operations and maintenance personnel. This shall provide rules for operations as determined and developed by the Core

Systems Contractor and accepted by HART, including as a minimum:

- A. General Safety Rules
- B. Normal operating mode(s)
- C. Failure operating modes
- D. Operational overrides and adjustments
- E. Start-up and shutdown
- F. Mode transition and train adjustment
- G. System restart
- H. Manual train operations
- I. Recovery of stalled trains
- J. Fire on board a train
- K. Fire in a station
- L. Fire in the MSF
- M. Fire in the Yard
- N. Electrical safety
- O. Emergency evacuation
- P. Operations & Maintenance personnel safety

- Q. Systems security
- R. Vehicle coupling/uncoupling
- S. Train failures
- T. ATC failures
- U. Fare vending failures
- V. Power distribution failures
- W. Command, control & communication failure
- X. Manual switch operation
- Y. Responses to earthquakes, hurricanes, and other severe weather or environmental conditions
- Z. Other conditions determined to be required by the Core Systems Contractor and/or HART.
- AA. Platform Screen Gate System equipment failure.

#### **TP-3.2.7 Training Plan and Program**

The Core Systems Contractor shall train and certify all of its operating and maintenance personnel in the proper operation and maintenance tasks for the System. If requested by the City, the Core Systems Contractor shall include up to twelve (12) City designated personnel in these classes. As part of the System Safety and Security Program, the Contractor shall also provide instruction for up to one hundred (100) of the City and County of Honolulu's fire, safety and Level 2 Security personnel and those of other agencies affected by the System as part of the Core System Contractor's initial and/or on-going training programs. This training shall provide an overview of System elements and operations, describe the features and facilities available to emergency response personnel and address applicable operation safety procedures.

Training shall include the subjects listed in the Rule Book and the following:

- Emergency entry into trains and non-public areas, including the guideway envelope and ATC territory.
- Operational information concerning train and platform emergency exits.
- Specific hazards of System operations.
- Special emergency and fire appliances available within train or at station facilities.
- Hazardous chemicals, if any, stored on the System premises necessary for operations.

The Core Systems Contractor shall provide a Training Plan which shall define the training program including subjects, schedules, discussions of topics, methods and materials to be used, and general approaches to train Core Systems Contractor O&M staff and, if requested, City and other agency staff.

The Core Systems Contractor shall provide all instructors, literature, and equipment necessary to train personnel. DVDs of the training sessions shall be prepared to cover the complete scope of the classroom training. These training DVDs shall be of professional quality and content. They shall consistently and appropriately show the instructor and close-ups of the training materials or aids. The DVDs shall be catalogued for easy retrieval. As part of the Training Plan, a copy of the DVDs for each training session shall be submitted to HART to be available for the City's future use.

The Core Systems Contractor shall provide sufficient classroom and on-the-job training for operations and maintenance personnel to ensure their competence in operating and maintaining the System. Training of Controllers shall be conducted using the System Simulator so as not to be disruptive to the on-going System installation and test activities. Training on the actual system equipment and/or the spare equipment will be permitted; however, such use shall not interfere with System verification, acceptance and operations activities.

The Core Systems Contractor shall implement a testing program whereby personnel within each specific job classification are tested for proficiency within that job classification. With concurrence by HART, certain job classifications may be exempted from such testing. Personnel shall pass the testing program appropriate to their positions prior to assuming those positions on a full time basis.

Prior to the initiation of passenger service, the Core Systems Contractor shall provide to HART Training Reports with the quantitative results of all examinations administered to the trainees during and upon completion of the training program. The results of these tests shall be sufficient for the Core Systems Contractor and HART to evaluate the competence of trainees for their specific assignments in the operation and/or maintenance of the System and shall be aligned with the expected results set forth in the Training Plan.

The Core Systems Contractor shall provide draft, interim and final versions of the Training Plan and Program, including all training plans, schedules, manuals, instructional materials and examinations required for training of operating and maintenance personnel. Such documents shall be supplied prior to the scheduled start of the System Demonstration and shall be available at the time the actual training is given.

#### **TP-3.2.8 System Assurance Monitoring Plan**

A System Assurance Program shall be implemented to ensure that the System Service Availability requirements of Section 3.3 are fulfilled while minimizing and controlling the operations and maintenance costs. The requirements of the System Assurance Program are presented below.

##### **TP-3.2.8.1 System Assurance Monitoring Plan**

The Core Systems Contractor shall prepare and submit for HART's review and acceptance a System Assurance Monitoring Plan. This Plan shall set forth the Core Systems Contractor's proposed methodology and procedures for recording/logging all operating incidents and for collecting and analyzing data to measure system assurance parameters during passenger service. The System Assurance Monitoring Plan shall include all procedures, instruments, software and all data requirements, data sources, data-gathering techniques and computational methods to be used in



recording actual system performance, comparing it with the requirements contained in the Core Systems Contract, Section 3.3, and preparing reports as required by Section 3.4.8.

All operating incidents shall be automatically recorded by the System's central computer. The use of software to generate operating performance reports is required. A manually written Controller log shall also be maintained and used to assist with determining exclusions and otherwise interpreting computer based data. Access to source data and software will be made accessible to City personnel on a connected terminal at the MSF.

#### **TP-3.2.8.2 System Maintainability**

The System design shall minimize both maintenance costs and out-of-service time for the System and its subsystems. This shall be accomplished by: 1) configuring subsystems for ease of preventive maintenance, troubleshooting, repair and checkout; and 2) providing facilities, equipment, and procedures adequate to accomplish the necessary maintenance tasks effectively and efficiently. Qualified maintenance personnel shall be involved in the project design, fabrication, construction and testing to the extent necessary to verify that maintainability, operability, and dependability requirements will be enforced.

The Core Systems Contractor shall include appropriate maintainability requirements in specifications for subcontractor and vendor items procured for the System. Procedures shall be implemented for assuring that the subcontractors' and vendors' maintainability procedures are consistent with overall system/equipment requirements and that adequate surveillance of the subcontractors and vendors will be maintained to enforce compliance with all maintainability requirements specified.

#### **TP-3.2.9 Safety and Security Programs**

The Core Systems Contractor and System shall achieve the highest practical level of System safety and security through the implementation of comprehensive System Safety and Security Programs as specified in this Section and in the Safety and Security Management Plan (SSMP) of the Project. The following subsections identify the minimum required activities to provide safety and security as needed for System operations and maintenance. Their intent is not to be prescriptive, but rather to define the areas and extent of such a program, which in many cases is a continuation of programs and activities established during the Design-Build phases of the Core Systems Contract. The Core Systems Contractor is not limited to the activities identified in these subsections, and shall include in its Safety and Security Programs any other activity it considers important to assure safety and security. The Core Systems Contractor may use its previously established safety and security programs provided that they meet the intent and objectives of the following subsections, have been successfully applied to similar Systems and projects, and are accepted by HART.

##### **TP-3.2.9.1 Safety and Security Committee**

As part of the System Safety and Security Program, HART and the City have established a Safety and Security Oversight and Review Committee (SSRC). This SSRC will include City and HART Project representatives; other City and State safety, security, and operations representatives of the City; and the Core Systems Contractor. The SSRC will focus its activities on System Safety and Security and not on occupational safety, which is the Core Systems Contractor's responsibility. This SSRC will consider overall safety and security policy issues, review the Core Systems Contractor's System Safety and Security Programs, and develop coordinated City-System procedures and responses to operations and emergency activities. The Core Systems Contractor's Safety and Security Program Plans shall be

developed in coordination with the SSRC. The SSRC will be active throughout all phases of the Core Systems Contract, including the O&M Period.

#### **TP-3.2.9.2 System Safety Program**

A System Safety Program shall be implemented by the Core Systems Contractor in accordance with: 1) Section 3.1, System Safety Program, ASCE 21-96; 2) FTA and APTA Transit Industry Standards; 3) MIL-STD-882C; 4) 49 CFR Part 673; and 5) the requirements of this Section. The System Safety Program shall emphasize the prevention of accidents by resolving hazards in a systematic manner in accordance with Section 3.2.9.4. A System Safety Program Plan (SSPP), described in Section 3.2.9.3, shall identify the responsibilities of all parties for implementing the System Safety Program.

#### **TP-3.2.9.3 System Safety Program Plan**

Throughout the design and implementation of the System, including all O&M Periods, all participants shall follow a Core Systems Contractor-prepared, HART and/or City-accepted System Safety Program Plan (SSPP) developed in accordance with the SSMP; Section 3.1.1, System Safety Program Plan, ASCE 21-96; FTA and APTA Transit Industry Standards; 49 CFR Part 673; and the requirements of this Section. The SSPP shall stress early hazard identification and elimination or control. Occupational safety during construction and installation shall be covered in the System Safety Program Plan. This shall include Core Systems

Contractor's responsibility for all site and facility safety where such sites and/or facilities, including those by others, have been turned over to and placed under the control of the Core Systems Contractor.

The Core Systems Contractor shall submit its SSPP in accordance with this Section and related Federal and State requirements. Essential aspects of the System Safety Program to be addressed in the SSPP are:

General - The SSPP shall, at a minimum:

- Include FTA and APTA Transit Industry Standards and best practices; APTA Manual of Standards and Recommended Practices for Rail Transit Systems; 49 CFR Part 673 Public Transportation Agency Safety Plan; 49 CFR 674 State Safety Oversight (HDOT).
- Include all interfaces with the facilities provided by others, and identify all hazards within those facilities that could result from the unique characteristics of the System.
- Establish the position of Safety and Security Manager to be responsible for activities set out in the SSPP.
- Establish an incident and accident investigation and reporting process, including the process for alerting, notifying, and reporting to the City and/or HART, State, and other appropriate governmental agencies in compliance with the following:
  - 49 CFR Part 225 - Railroad accidents/incidents: Reports classification, and investigations.
  - 49 CFR Part 655 - Prevention of alcohol misuse and prohibited drug use in transit operations.

- 49 CFR Part 673 - Rail fixed guideway systems; State safety oversight.
- 49 CFR Part 840 - Rules pertaining to notification of railroad accidents.
- 29 CFR Part 1904 - Recording and reporting occupational injuries and illnesses.
- APTA Manual of Standards and Recommended Practices for Rail Transit Systems.
- All other City, State, and Federal regulations, as required.
- Provide for and maintain Core Systems Contractor's safety commitment and acceptance in the form of a signed policy and the allocation of resources.

**Safety and Security Manager:** The Core Systems Contractor shall designate a single individual as Safety and Security Manager. This individual shall be included in the Core Systems Contractor's list of key management and technical staff and have single point responsibility for all safety and security issues. The Safety and Security Manager shall coordinate with HART and/or the City on issues related to accidents and injuries, fire safety, construction and site safety, and all other safety and security matters. The Core Systems Contractor's Safety and Security Manager shall have clear evidence of authority to insure implementation of the System Safety Program and System Security Program, and shall report directly to Core Systems Contractor's Senior HQ management and not directly to the Core Systems Contractor's Project Manager or the O&M Director. All safety and security personnel employed by the Core Systems Contractor shall report to the Safety and Security Manager.

**Design Safety Confirmation:** The Core Systems Contractor shall provide confirmation that all safety critical subsystems as required in TP-2, "Verification Test and Acceptance" are designed safe.

**Operational Safety Procedures:** The Safety and Security Manager, working closely with HART and the City, shall develop operational procedures to deal with both normal and abnormal System operations. Abnormal operations shall include accidents, passenger injury, fire, emergency evacuation, vehicle retrieval, bomb or terrorist threats, passengers on the guideway, maintenance personnel safety, and other safety issues requiring standard operating procedures. The Core Systems Contractor shall prepare Operational Safety Procedures for both normal and abnormal operations which document proper procedures for these situations. These Procedures shall be reviewed by HART and the City and used to ensure that the System design can accommodate necessary operational, emergency, and failure management responses. Once accepted by HART and the City, these procedures shall be incorporated in the System Operating Manuals and the Rule Book. Instruction as to their use shall be provided to all Core Systems Contractor and selected City personnel in accordance with requirements of the Training Program.

**Safety Document Files -** The Core Systems Contractor shall maintain a complete set of safety files with all documents required by or supporting the requirements of this Section. These files shall be provided to the HART as a condition to issuance of the Certificate of Final Acceptance.

#### **TP-3.2.9.4 Hazard Identification, Analysis and Resolution**

The Core Systems Contractor shall continue to implement and adhere to procedures for the identification, analysis and resolution of hazards as specified in this Section throughout the O&M

Period. The steps involved in this process shall be: (1) Hazard Identification; (2) Hazard Analysis; and (3) Hazard Resolution.

Hazard Identification and Resolution shall be completed in accordance with the System Safety Program Plan (SSPP) of the Project, and Section 3.1.2, Hazard Resolution Process, ASCE 21-96, FTA Guidelines for Hazard Management.

As a minimum the following detailed analyses shall be conducted and submitted to HART and/or the City.

- Preliminary Hazards Analysis (PHA).
- Subsystem Hazards Analysis (SSHA).
- System Hazards Analysis (SHA).
- Operating and Support Hazards Analysis (O&SHA).
- These analyses shall be conducted in general accordance with MIL-STD-882C, Tasks 202 (PHA), 204 (SSHA), 205 (SHA) and 206 (O&SHA) or City-accepted equivalents.
- Risk assessment estimates shall be in accordance with SSMP.

The Core Systems Contractor shall comply with all requirements of the Hazardous Communication Standard, OSHA Standard 1910.1200. Analyses shall be conducted for the express purpose of identifying unresolved hazards, establishing their causes and verifying that all “unacceptable” and “undesirable” hazards, in accordance with SSMP, have been appropriately/acceptably resolved. Applicable analyses conducted for previous automated fixed guideway transit systems using the same equipment are acceptable where it can be shown that no changes have been made which affect safety.

#### **TP-3.2.9.5 System Security Program**

The Core Systems Contractor shall prepare and submit for acceptance by HART a System Security Plan (SSecPP). This plan shall deal with security for the completed System and not construction security. At a minimum, the SSecPP shall include:

- Identification of all security requirements, features, and functions to be included in the System.
- Security criteria and requirements to be met in preparing the System Operations Plan and System Operating Manuals. This shall include requirements for responding to acts of crime or vandalism and various passenger incidents such as lost articles, lost child, etc.
- Procedures for System operations personnel who will monitor passengers, handle service disruptions, and provide System security.
- Overall security organization to meet the requirements of this Section and the SSecPP.

- Identification of a single individual as Safety and Security Manager. This individual shall be included in the Core Systems Contractor's list of key management and technical staff and have single point responsibility for all security issues.

The Core System Contractor shall be responsible for all security monitoring (other than specific Level 2 incidents assigned to, or identified by, the Level 2 personnel pursuant to paragraph C below) and reporting functionality across the system and including CCTV security monitoring, and security reporting by means of any employees deployed within the system. The Core Systems Contractor shall monitor and manage the overall performance of the SSSP and shall co-ordinate the activities of all security providers on the System including:

- A. Security monitoring at the OCC provided by the Core Systems Contractor through various means including CCTV intruder detection systems, radios, emergency telephones within the System and reporting of security matters from the operation and passengers;
- B. Level 1 Security - service attendants on trains and within stations provided by the Core System Contractor will be a major component for the security assurance on trains and at station locations. Responsibilities will include activities such as the prevention of access to non-public areas, prevention of damage to security support systems (CCTV), customer assistance and crowd control;
- C. Level 2 Security – roving uniformed security on trains, within stations and at parking facilities and other areas frequented by transit patrons provided by the City, or a security company retained by the City, to provide assistance where a show of force or strength is required by the Core Systems Contractor staff. It is expected that this security force will be sufficient in numbers to enable attendance at any station in the System within 2 operating headways of being called. This Level 2 security will include a supervisor posted within the OCC in order to coordinate with OCC staff and manage Level 2 response to applicable security incidents identified by the Core Systems Contractor or Level 2 staff;
- D. Level 2 Security – uniformed security at MSF, TPSS and other buildings/facilities housing System equipment provided by Core Systems Contractor to manage access and protect key System assets; and
- E. Level 3 Security - law enforcement by Honolulu City Police as and when called for assistance by the Core Systems Contractor or Level 2 Security to address actual or suspected criminal activity.

#### **TP-3.2.9.6 Right-of-Way Signage**

The Core Systems Contractor shall furnish and install right-of-way signage required to support operating and maintaining the System. The following types of signs shall be included:

- A. Code-related signs, markers, and labels relating to personnel safety, such as contact rail coverboard warnings, right-of-way fence warnings, and crosswalk striping.
- B. Signs, markers and labels affixed to blue light stations.

- C. Signs, markers and labels affixed to apparatus situated along the trackway, including but not limited to switch machines, train control components, communications antennas and other communications devices, contact rail segments, junction boxes, and pull boxes, coordinated with milepost.
- D. Milepost markers along the right-of-way and within the guideway box, at intervals of 100 ft.
- E. Signs along the emergency walkway indicating, at intervals of approximately 500 ft. distance to each of the adjacent stations.
- F. Signs, markers and labels affixed to any Core Systems apparatus situated within the guideway box, coordinated with milepost number.
- G. Guideway column markers, coordinated with milepost number.
- H. Signs, markers and labels affixed to apparatus situated adjacent to the guideway including but not limited to TPSSs, GBSs, train control components, communications antennas and other communications devices, junction boxes, man holes and pull boxes, coordinated with milepost number.
- I. Signs, markers and labels affixed to apparatus situated in the MSF, including but not limited to switch machines, train control components, cameras, antennas and other communications devices, contact rail segments, motorized disconnect switches, junction boxes, man holes and pull boxes.

The Core Systems Contractor shall submit, for approval, a comprehensive listing of all signage required to support operating and maintaining the System, as well as the size, text, and material for each type of sign.

#### **TP-3.2.10 Emergency Plan**

The Core Systems Contractor shall prepare and submit for HART's acceptance a plan for emergency scenarios. These plans shall address at least the following situations:

- A. Fire in stations
- B. Fire on the guideway
- C. Fire on a train
- D. Fire in the MSF and Yard
- E. Severe weather
- F. Flooding
- G. Earthquake

**H. Vehicle and other accidents**

**I. Attended and unattended passenger evacuations onto the emergency walkway and from the guideway**

**J. Passenger and O&M staff medical emergencies**

**K. Potential and actual attacks on public, staff, and facilities**

This Emergency Plan shall also include plans and procedures for periodic drills to train and test the Core Systems Contractor O&M staff, and HART and other City agency emergency services staff. Readiness drills shall be held before System acceptance and not less than annually thereafter in accordance with Section 3.4.12.5 and the requirements herein. Specific procedures to be included in these drills shall be recommended by the Core Systems Contractor for acceptance by HART.

**TP-3.2.11 Form and Updates of Plans and Manuals**

All plans and manuals required in Section 3.2 herein, shall be submitted by the Core Systems Contractor to HART. The Core Systems Contractor shall establish a process to update parts of each plan and manual as required and as new information becomes available from testing and operating and maintenance experience. This process shall be submitted to HART and shall be followed throughout the testing, demonstration, and O&M periods.

The Core Systems Contractor shall update and submit the programs, plans, manuals, and books described in Section 3.2 herein for each O&M period described in Section 3.1, including for each Intermediate O&M Period described in Section 3.1.4 and upon hand-back of the system. Updates shall take into consideration any subsystem changes due to obsolescence or overhaul, modification due to fleet defect, introduction of new maintenance or test equipment, change in regulatory maintenance intervals, and City approved optimizations. Copies of all updates shall be provided to HART and/or the City. All manuals and plans shall be prepared in the American English language and written using text, terminology, diagrams and drawings that are clear, concise, and understandable by the controllers, technicians, supervisors, managers and engineers who will use them for work and training. All materials, manuals, procedures, plans, catalogs and lists provided shall be delivered in the quantity specified, and shall become the property of the City for its unrestricted use throughout the life of the System.

**TP-3.2.12 O&M Mobilization Period Plan**

The Core Systems Contractor shall prepare and submit for HART's review and acceptance a plan for the O&M Mobilization Period. This plan shall be a firm schedule for all mobilization activities, indicating how the Core Systems Contractor intends to establish, train, and guarantee the proposed organization that is capable of operating and maintaining the System.

This Plan shall address at least the following:

- A. The schedule for the establishment of the System O&M and management organization.**
- B. The schedule for developing and implementing the required O&M plans and documents.**

- C. The schedule for the recruitment, hiring, and employing of all operations and maintenance personnel.
- D. Milestones concerning the implementation of organizational processes and procedures such as drug testing, labor policies, rostering, training, etc.
- E. The procurement of common tools, miscellaneous equipment, consumables, employee amenities, and spare parts and equipment.
- F. The development and implementation of subcontracts for maintenance to be performed by subcontractors.
- G. The acquisition and renewal of all licenses and permits required to operate the System and associated facilities and equipment.
- H. Capital Asset Replacement Program (CARP) development and implementation.

**TP-3.2.13 Asset Management**

The Core Systems Contractor shall manage the System assets follows:

**A. GENERAL REQUIREMENTS**

The Core Systems Contractor shall prepare and implement an Asset Management Plan in accordance with ISO 55001. The Asset Management Plan shall address asset management processes, activities, tools, the annual asset management work and work planning. This Asset Management Plan shall provide comprehensive documentation of how the Core Systems Contractor will manage the assets over their lifecycle, an asset inventory, information on asset condition and performance, and a plan for asset preservation and/or renewal as applicable. The plan shall assure each asset is kept in a State of Good Repair during its lifecycle and be used as the foundation for all Maintenance Plans.

**B. ASSET MANAGEMENT PROGRAM**

The Core Systems Contractor's asset management program shall include all of the assets managed as part of the O&M Work. Asset maintenance, rehabilitation, overhaul, and replacement process, including Renewal Work, shall be based on continual ongoing and systematic condition and performance assessments. The program shall incorporate the following objectives:

1. Strategy that adopts and continually seeks to improve asset management
2. Practices as established by reference to good industry practices;
3. Maintains the performance and condition of the assets, to minimize, both during the agreement term and a reasonable period thereafter, risks to safety and service losses;



4. Asset lifecycle activities are resourced with persons with the necessary competence to undertake the work safely and legally;
5. Documentation of asset management system and activities, as necessary defined by this Agreement, applicable legal and regulatory requirements, and as indicated by Good Industry Practice;
6. The Core Systems Contractor determines and is managing risks, so as to prevent or reduce undesired effects; and
7. Provide the City with assurance and documentation in relation to the above.

The Core Systems Contractor shall develop and document its asset management practices to achieve the objectives above; comply with this Agreement; demonstrate the practices implemented are suitable and remain suitable and effective for delivering the performance, service, and asset conditions set out in this Agreement; that practices have been developed with Good Industry Practices in mind; and are consistent with the requirements set out in the International Standard for Asset Management - Management Systems - ISO-55001.

The Core Systems Contractor shall submit to the City its program of achieving ISO-55001 compliance however, actual ISO-55001 certification is not required. The Core Systems Contractor shall establish its Asset Management - Management System before the assets are transferred into operational use.

The Core Systems Contractor shall establish and document asset management decision making criteria that demonstrates an efficient and economic whole life cost approach to decisions regarding the balance between maintenance, overhaul, renewal and enhancement of asset systems, subsystems and components regardless of when such decisions are made.

The Core Systems Contractor shall develop, document and continuously refine the Asset Management Plan that establishes the organization capabilities for managing the assets. The Asset Management Plan shall consider:

1. The Core Systems Contractor's overall approach or framework to managing assets;
2. The Asset Management Objectives that shall be adopted at relevant functions and levels that shall be used to monitor performance and progress of the asset management practices; and
3. Functional Strategies and specific processes for managing lifecycle activities.

### **C. ASSET MANAGEMENT PLAN**

The Asset Management Plan and subsidiary plans and procedures shall include, at a minimum:

1. The inventory of assets, including description, location, cost, age, and current condition;
2. Estimated Useful Life and projected Residual Life by asset;

3. Criteria for determining whether rehabilitation, overhaul, or replacement will be used such that the asset meets the operational, performance, and life-remaining requirements of the asset;
4. Specific details identifying which assets will be replaced requiring a Planned Service Interruption in the upcoming twelve (12) months;
5. Planned preventive maintenance of the asset over its lifecycle consistent with the accepted Maintenance Plans;
6. Planned Renewal Work, including refurbishment, major rehabilitation, overhaul, or replacement of the assets throughout the O&M Period;
7. Process to recover asset condition as result of an accident;
8. Projected rehabilitation, overhaul, and replacement costs and anticipated replacement timing for each asset;
9. Process for assessing and reporting on risk associated with asset failure, likelihood of occurrence, magnitude of impact, and mitigation strategies should the risk be realized;
10. Identification of those assets which are critical to Project performance;
11. Method and procedures for determining condition and Residual Life of asset;
12. Establish criteria for asset preservation including implementation of preventive maintenance program;
13. Estimated cost in current operating Year dollars of asset management work for each year of the O&M Period;
14. Summary of major asset rehabilitation, overhaul and replacement completed in each previous fiscal year; and
15. Method for recording condition, performance, and history for each asset in inventory (manual or software based).
16. The Asset Management Plan shall include a description of the organization responsible for asset preservation and the organizational relationship to the Core Systems Contractor's senior management.
17. The Core Systems Contractor shall submit the Asset Management Plan according to the following schedule:
  - a. A minimum of six (6) months before the scheduled start of System Demonstration; and
  - b. Annually on every anniversary of the start of System Demonstration.

18. Asset Management Plan and Risk Management

The Core Systems Contractor shall develop and document a risk register that demonstrates a proactive approach for each asset and the work plans necessary to implement these approaches for each asset (The Asset Management Plan).

The Core Systems Contractor shall document its processes for assessing and reporting on risks associated with asset failure, likelihood of occurrence and magnitude of impact. The Core Systems Contractor shall develop and document the risk register. The risk register shall demonstrate a proactive approach to reducing safety, service, operations, financial, weather and climate related and other risks associated with the management of the assets.

The Core Systems Contractor shall describe its processes to recover asset condition to operational and performance requirements following an accident, damage to, fault or failure of the asset.

19. The Asset Management Plan shall include a description of the organization, group, division, or unit that is responsible for the asset preservation, and the organizational relationship to the Core Systems Contractor senior management.

### **TP-3.3 SYSTEM SERVICE AVAILABILITY**

#### **TP-3.3.1 General**

This Section provides the requirements for System Service Availability. System Service Availability is a measure of the total quantity and quality of transportation service actually provided compared with that scheduled to be provided over a given time period. System Service Availability (A) is defined as the product of Service Mode Availability ( $A_m$ ), Fleet Availability ( $A_f$ ), and Station Platform Screen Automatic Gate Availability ( $A_s$ ), each of which is determined for the same specific service mode and time period.

The Normal Operating Mode defined in Section 3.4.3.1 shall normally be provided and shall receive full credit when scheduled for the period provided. The Failure Operating Modes of Section 3.4.3.2 used for failure management purposes may receive partial System Service Availability credit as described below.

The units of hours used to calculate service availabilities shall be taken from actual measurements made in hours, minutes and seconds. Accuracy of ATC-based data for such calculations shall be to the rounded hundredth of an hour.

#### **TP-3.3.2 Service Mode Availability**

Service Mode Availability for each time period during which a specific operating mode is provided is defined as:

$$A_m = \frac{AMH}{SMOH} \times K$$

Where:

- A. AMH = Actual Mode Hours. The total time, in hours, that the System is scheduled to provide passenger service in the specific operating mode minus the total time, in hours, of all mode downtime events occurring while the System is scheduled to provide service in the specific operating mode. AMH is calculated by subtracting mode downtime hours from scheduled mode operating hours,  $AMH = (SMOH - MDH)$ .
- B. SMOH = Scheduled Mode Operating Hours. The amount of time recorded in hours for which a specific operational mode of service is scheduled to be provided.
- C. MDH = Mode Downtime Hours. The total time, in hours, of all mode downtime events occurring while the System is scheduled to provide service in the specific operating mode.
- D. Mode Downtime Event. An event in which one or more System-related problems cause an interruption of the normal service provided by the desired operating mode. When such an interruption occurs, downtime for the event shall include all the time from the beginning of the interruption until all trains stopped on the guideway are restarted and normal operation in the scheduled mode is restored (i.e. continuous headways). Downtime events of a duration that are:
- a. less than one operational headway; or
  - b. for events that are caused solely by the failure of a Station Platform Screen Automatic Gate and are less than the lesser of two operational headways and 15 minutes;

shall not be counted in the calculation of Service Mode Availability, but shall be counted for Section 3.3.6.2 downtime limits purposes. A train stopping on the guideway or failing to depart from a station shall be considered a Mode Downtime Event. Stoppages resulting from causes listed below as exclusions shall not be counted as Mode Downtime Events.

- E. Exclusions. The following events are not attributable to the System itself and are not mode downtime events. Delays due to these exclusions are not to be used in determining Service Mode Availability, and shall result in the entire period affected by them being deleted from consideration in calculating Service Mode Availability (i.e., SMOH is reduced), but not from data collection and storage. All data collection means shall include all periods of time; exclusions shall be determined subsequently upon review by the Core Systems Contractor and the City. The Core Systems Contractor shall bear the burden of proving that an exclusion applies.
1. The time period to transition from one scheduled operating mode to another scheduled operating mode or adjusting scheduled fleet size. Valid transition periods shall not be counted in calculating  $A_m$ . Time in excess of allowable transition time by more than one operational headway, as operated during the peak period for the route, shall not be excluded, but the availability achieved during that period shall be adjusted by a "K" factor, as specified in Section 3.3.5. The time to change into and out of a lesser, nonscheduled, operating mode due to a failure of the scheduled, or higher-order backup, operating mode shall not be excluded, but shall be counted as the lower of the operating modes.

2. Passenger-induced interruptions or delays.
3. Interruptions caused by intrusions of unauthorized persons or of animate or inanimate objects into non-public areas of the System.
4. Interruptions caused by non-System induced loss of service, e.g., loss of utility service, electrical power provided outside the nominal range, vehicle diversion resulting from intended security responses, force majeure, and acts or omissions of the City or its agents or contractors.
5. Periods of scheduled operating times when the specified environmental limits are exceeded.
6. Periods when the Fixed Facilities are not available, unless their unavailability is attributable to the Core Systems Contractor or its vehicles/subsystems.
7. Operational delays induced by the ATC system to regulate train operations, maintain schedules and for anti-bunching; where such delays do not exceed the operational headway for the route. Trains shall be held to normal pre-programmed dwell times for each station.

F. K = K Factor. Used to calculate partial Service Mode Availability during failure mode operations. K factor values are depicted in Table 1. When the System is not in any failure mode, the K factor shall be equal to one.

### TP-3.3.3 Fleet Availability

The Fleet Availability for each time period during which a specific operating mode is provided accounts for fleet reliability and the ability to provide the scheduled capacity at the scheduled operational headway, and is defined as:

$$A_f = \frac{AVH}{SVH}$$

Where:

- A. AVH – Actual Vehicle Hours. The cumulative vehicle hours actually operated in the System in trains not exceeding the train size scheduled for the specific operating mode period. This is calculated as the product of the actual number of Fully Functional Vehicles provided in the specific operating mode, and the time, in hours, during which that operating mode and those vehicles operate, minus all vehicle downtime. The actual number of vehicles shall not exceed the scheduled number for the hours operated, either in the aggregate or in any train.
- B. SVH – Scheduled Vehicle Hours. The product of the total number of vehicles required for the specific operating mode and the time, in hours, scheduled for that mode.
- C. Train/Vehicle Downtime Event. An event in which the scheduled service of a train is interrupted, or a vehicle is not fully functional, for a duration equal to or greater than

the operational headway. The accrual of vehicle downtime concludes when the vehicle is fully functional. Events caused by conditions (2), (3), (4), (5), (6) and (7) of Section 3.3.2.E shall be excluded.

- D. Fully Functional Vehicles. A vehicle shall be counted as fully functional unless it has a Priority I or II malfunction, described below, or unless it has any inoperable passenger service doors. Vehicle doors consisting of two, bi-parting panels shall be considered as one "door".
- E. Priority I alarms are those that pose an immediate threat to passenger safety and/or System operations; and thus require immediate action. Priority I alarms shall include at least the following:
  - 1. Loss of presence detection for any vehicle or any uncertainty regarding its location.
  - 2. Train violation of safe separation assurance distance.
  - 3. Unauthorized train motion detected.
  - 4. Train overspeed or improperly high acceleration rate.
  - 5. Train speed measurement failure.
  - 6. Train unexpected loss of zero speed.
  - 7. Parted train detected.
  - 8. Train obstructed motion detected.
  - 9. Train emergency brake application.
  - 10. Train loss of propulsion power.
  - 11. Train stopped (by fault) on the guideway.
  - 12. Train failed to respond to poll for data communications.
  - 13. Vehicle fire/smoke detected.
  - 14. Vehicle parking, service or emergency brake failure.
  - 15. Vehicle propulsion system failure.
  - 16. Vehicle suspension system failure, including deflated airbags, as applicable.
  - 17. Vehicle unsafe side door blocking failure.
  - 18. ATC signal loss detected.

19. Unscheduled door unlocking or opening.
20. Loss of propulsion or auxiliary power from a substation.
21. Emergency call request from vehicle.
22. Loss of vehicle voice communication.

Priority II alarms are those that do not pose an immediate threat to either passenger safety or System operations, but that could cause a potential threat to safety or System operation if not corrected quickly.

Priority II alarms shall include at least the following:

- Train failed to depart a station within ten seconds after all doors (vehicle doors and platform Gates) are closed and locked and brakes are released.
- All doors (vehicle doors and platform Gates) failed to open within ten seconds after train stops.
- All doors (vehicle doors and platform Gates) failed to close and/or lock when commanded or not consistent with an alarm from the PSAG
- All doors (vehicle doors and platform Gates) recycled three times or obstructed for more than ten seconds.
- Train to station alignment tolerance exceeded.
- Train more than ten seconds late arriving and stopping at a station.
- Train operating mode change (auto/manual).
- Vehicle batteries low.
- Vehicle battery charger failure.
- Vehicle HVAC failure.
- Low vehicle air bag pressure.
- Removal of a vehicle fire extinguisher.
- Vehicle or train overload condition.
- Attempted switchover to redundant onboard ATC equipment failed.
- Vehicle PDS breaker tripped.

- Vehicle PDS overload or fault.
- Loss of public address in vehicle.

The Core Systems Contractor shall develop a complete list of Priority I and II alarms for review and acceptance by HART. The list shall reflect any unique characteristics of the Core System Contractor's equipment. The Core Systems Contractor shall determine appropriate response actions and procedures for all such alarms and include those in the Central Operations Manual required by TP-3.2.4. See TP-4, "Passenger Vehicles" for definitions and discussion of vehicle and train.

**TP-3.3.4 Station Platform Screen Automatic Gate Availability**

The Station Platform Screen Automatic Gate Availability for each time period during which a specific operating mode is provided is defined as:

$$A_s = \frac{APSAGH}{SPSAGH}$$

Where:

- A. *APSAGH* – Actual Platform Screen Automatic Gate Hours is the product of the scheduled number of station platform screen automatic gates operated on the System, and the time, in hours, of the specific operating mode, minus the total time of all Platform Screen Automatic Gate Downtime Events.
- B. *SPSAGH* – Scheduled Platform Screen Automatic Gate Hours. *SPSAGH* is the product of the scheduled number of platform screen automatic gates required to be operable and the time, in hours, for the specific operating mode.
- C. Platform Screen Automatic Gate Downtime Event. Any failure of station, wayside, or other System equipment or of software that renders a platform screen automatic gate not to operate as required when commanded to operate shall be counted as a Platform Screen Automatic Gate Downtime Event. For purposes of determining a Platform Screen Automatic Gate Downtime Event, platform screen automatic gates consisting of two bi parting panels per passenger dwell position shall be considered as one gate. A failure of one or more of the gates at the same time and at the same passenger dwell position shall be counted as one Platform Screen Automatic Gate Downtime Event.
- D. Exclusions:
  - a. Events caused by passengers, loss of primary utility service, or closing of the station or platform not due to System problems shall be excluded;
  - b. Events where no greater than one Platform Screen Automatic Gate at a single station platform has failed to operate and all of the following apply:
    - i. the failure occurs in the first 6 months following first commencement of revenue service for that station;
    - ii. the Platform Screen Automatic Gate has been locked out of service;



- iii. signage has been placed on both sides of the door that is out of service;
- iv. appropriate passenger announcements are being made on the train;
- v. a full time station attendant is available at the platform to assist passengers;
- vi. the Platform Screen Automatic Gate is repaired and operating correctly by the next start of revenue service.

E. In no case shall the Actual Platform Screen Automatic Gate Hours exceed the Scheduled Platform Screen Automatic Gate Hours either in the aggregate or at any station platform. If a station platform is not served because the guideway to it is blocked, it shall not be included in  $A_s$  but the event shall be counted as a mode downtime event for the calculation of service mode availability. The duration of time a station platform is closed due to conditions (2), (3), (4), (5) and (6) of Section 3.3.2.E, or the closing of a station or platform for other than System problems shall also be excluded. At a terminus station with two or more platforms, the failure of a platform screen automatic gate on one platform shall be excluded if the switchover to any spare platform at that location occurs within one minute and no train is affected by the failed platform screen automatic gate.

#### **TP-3.3.5 System Service Availability Determination**

For a specific time period (i),  $A_m$ ,  $A_f$ , and  $A_s$  shall be calculated in accordance with Sections 3.3.2, 3.3.3, and 3.3.4, respectively, for the mode, fleet, and station platform screen automatic gates required for the specific operations scheduled for that mode. System Service Availability shall be calculated as the product of  $A_m$ ,  $A_f$ , and  $A_s$ .

System Service Availability for that period of time shall then be calculated as:

$$A_i = A_{m(i)} \times A_{f(i)} \times A_{s(i)}$$

If a downtime event occurs and service is not restored within the time specified in Section 3.3.2.D to that scheduled for the System, but rather a lesser service mode is operated for failure management as defined in Section 3.4.3.2, then the entire time period for operating in any failure mode shall be counted as partial mode downtime. To determine  $A_m$  for the time period the System operates in failure mode, the appropriate K factor, as defined in Table 1, shall be used. Fleet and Station Platform Screen Automatic Gate Availability,  $A_f$  and  $A_s$ , respectively, shall be determined in accordance with the requirements of Sections 3.3.3 and 3.3.4 for that lesser mode of service over that period.

Downtime for an event shall be counted either with regard to the System, or the fleet, or the station platform Screen automatic Gates consistent with that portion of the System that is disrupted and shall not result in either double or triple-counting of downtime. Where it may be possible to count a downtime event in more than one area (i.e., mode, or fleet, or station platform automatic screen gate), it shall be counted in that area that best measures the quantity of service that is not available. Depending on the type of service provided, an extended period of downtime may be redefined to be two or more downtime events, each measuring best the quantity of service that is not available.

Cumulative System service availability  $A_c$  is calculated as follows (reference Table 2):

- A. Each service period (Column 1) is defined by the operating mode scheduled to be provided or actually provided.
- B. For each service period, the data shown in Table 2, Columns 2, 3, 4, 8, 9, 11 and 12 shall be provided.
- C. The calculated Service Mode Availability (Column 6), recorded Service Mode Availability (Column 7), Fleet Availability (Column 10) and Station Platform Screen Automatic Gate Availability (Column 13) shall be determined following the instructions of Table 2.
- D. The time-factored System Service Availability (Column 14) shall be determined following the instructions of Table 2.
- E. The Cumulative System Service Availability ( $A_c$ ) for any calendar time period is the sum of the time-factored System Service Availabilities (Column 14) over the calendar period divided by the sum of all scheduled service times (Column 2) for the same calendar period (see instructions in Table 2).

The Core Systems Contractor shall provide an automated process to gather and analyze the data required for calculating System Service Availability and for accountability of service mode downtime events against the specified limits of Section 3.3.6.2. This process, including the details of definitions, K factors, calculations, and reporting, shall be included in the System Assurance Monitoring Plan in accordance with Section 3.2.8. This automated process may also include the collection of other data related to service quality.

**K Factors for  $A_m$**

FAILURE OPERATING MODE	K FACTOR FOR $A_m$
Time in excess of allowable transition time by more than one operational headway	TBD
Shuttles	TBD
Skip-Stop Modes	TBD
Short Turnback Modes	TBD
Single Tracking (Rumaround) Modes	TBD
Multiple Combined Failure Modes	TBD

During all times when the system is operated in failure mode an appropriate K Factor shall be applied to the mode availability factor,  $A_m$ .

This K Factor shall be calculated as follows for the chosen failure mode:

$$\text{K Factor} = \frac{\text{End to End System Capacity PPHPD under Failure Mode}}{\text{Scheduled End to End System Capacity PPHD}}$$

Such capacities shall be determined, based on the Core Systems Contractor's system performance and failure management analysis, as a ratio of the quantity of service delivered by the lesser service mode to that of the scheduled normal service mode, and additional reductions shall be imposed for other degradation in service, including passenger transfers, which shall require a reduction of at least 0.2.

**Table 2: System Service Availability Data Table**

Service Period (i)	Service Time (Ti)	Scheduled Operating Mode	Actual Operating Mode	Applicable K Factor	Calculated Service Mode Availability	Recorded Service Mode Availability (Am(i))	Scheduled Vehicle Hours	Actual Vehicle Hours	Fleet Availability (A(i))	Scheduled Station Platform Screen Automatic Gate Hours	Actual Station Platform Screen Automatic Gate Hours	Station Platform Screen Automatic Gate Availability (As(i))	Time-Factored System Service Availability (Ti x Ai)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
One Line for Each Date and Time Period	(Hours)	(Mode)	(Mode)	(1 or K)*	(See § 3.3.2)	(5)*(6)	(See §3.3.3)	(See § 3.3.3)	(9)/(8)	(See § 3.3.4)	(See § 3.3.4)	(12)/(11)	(2)*(7)*(10)*(13)
<b>Totals:</b>	<b>Sum all Hours</b>												<b>Sum all Values</b>

Then, Cumulative System Service Availability is:

$$A_c = \frac{\sum_{i=1}^n (T_i \times A_i)}{\sum_{i=1}^n (T_i)}$$

**TP-3.3.6 System Service Availability Requirements**

This Section sets the availability requirements for System acceptance, as well as for the O&M periods described in Section 3.1.

**TP-3.3.6.1 System Service Availability Levels**

As a condition precedent to the issuance of the Certificates of Substantial Completion (CSC), cumulative System Service Availability for the System Demonstrations conducted in advance of any O&M period that will sustain fully-automated operations, computed in accordance with Section 7.3.5, shall be at least 98.5 percent averaged for a period of 30 consecutive days.

For the Intermediate, Full, and Optional O&M periods described in Section 3.1, the Cumulative System Service Availability for each calendar month shall be at least 99.5 percent to be eligible for full O&M payment. If a Cumulative System Service Availability of at least 99.5 percent is not met during any month of the O&M period, the compensation otherwise payable under the Contract shall be reduced in accordance with SP-6.

As a condition precedent to the issuance of the Certificate of Final Acceptance Cumulative System Service Availability computed in accordance with Section 3.3.5, shall be at least 99.5 percent averaged for a period of 180 consecutive days after the issuance of the Certificate of Substantial Completion for the System.

**TP-3.3.6.2 Service Mode Downtime Limits**

In addition to the System Service Availability requirements of Section 3.3, during each month of the Intermediate, Full, and Optional O&M periods, the System shall not exceed the Service Mode Downtime Limits of Table 3. If those Service Mode Downtime Limits are exceeded during any month of the O&M period, the compensation otherwise payable under the Contract shall be reduced in accordance with SP-6.

Additionally, no more than ten service mode downtime events of any duration shall occur during any day of operation.

**Table 3: Service Mode Downtime Limits**

Length of Service Mode Downtime Event	Maximum Number of Events per Month			
	Intermediate O&M Period		Full O&M Period	Optional O&M Period
	#1	#2		
Greater than 15 seconds and less than or equal to one minute	125	188	250	250
Greater than one minute and less than or equal to 10 minutes	25	38	50	50
Greater than 10 minutes and less than or equal to 20 minutes	1	2	2	2
Greater than 20 minutes and less than or equal to 45 minutes	0	1	1	1
Greater than 45 minutes	0	0	0	0

Should these downtime limits be exceeded during the O&M period, they shall be used to calculate reductions in payments for O&M services as described in Section SP-6.20.

**TP-3.3.6.3 Not Used**

**TP-3.4 OPERATIONS REQUIREMENTS**

The Core Systems Contractor shall provide all supervision, materials, and services required to operate the System as specified herein.

**TP-3.4.1 General**

The Core Systems Contractor shall operate the System in accordance with the most recent City-accepted operating documentation required by Section 3.2, to include the System Operations Plan, System Operations Manuals, and Rule Book. Updates to these documents shall be provided by the Core Systems Contractor in accordance with the procedures developed in the O&M Planning and Design Support Period on an as-needed basis at no additional cost to the City and, when approved by the City, shall become the basis for System operations.

Normal hours of operation and the level of service for the System will be as set forth in Section 3.4.2 and the Baseline Service Plans, as accepted by the City. On occasion, special events may necessitate extending or reducing System operations as compared to the normal operating hours, or altering the mode of operation, in accordance with Section 3.4.11.

All O&M Work performed by the Core Systems Contractor shall be in accordance with the City’s policies and procedures applicable to the System, as disclosed in writing to the Core Systems Contractor, or as specifically required by the City from time to time. The Core Systems Contractor may substitute its own standard practices and procedures after obtaining the City’s written approval. All policy decisions regarding System operation shall rest with the City. Such matters as the hours of System service, levels of service to be offered, public media information, and interfacing with the

public at large shall be the responsibility of the City. When officially notified by the City of a decision regarding the above matters, or any other matter that the City classifies as a policy decision, the Core Systems Contractor shall immediately take all appropriate steps to comply with that decision.

The Core Systems Contractor shall be responsible to conduct and carry out any and all passenger evacuations and respond to all emergencies. Such actions shall be fully coordinated with the appropriate local emergency services responders as agreed upon in the City-approved Emergency Procedures.

- Under no circumstances shall the Core Systems Contractor interrupt passenger service during scheduled service hours without prior written authorization from the City, unless failure to withdraw the System or a System component would impair the safety of the System or its users or general public, or would not result in any reduction in service.

**TP-3.4.2 Passenger Service Characteristics**

This Section defines the requirements for System operations during the Full O&M Period as set forth in Section SP-4.1, which shall apply to all parts of the System.

These requirements shall also apply in part to other O&M periods, where applicable. Baseline service plans describing the specific service levels for the Intermediate, Full, and Optional O&M Periods are provided in Section 3.4.6, Summary of Baseline Service Plans.

**TP-3.4.2.1 System Operating Hours**

The operating periods for the System shall be as described in Table 4.

**Table 4: System Operating Hours**

<b>Operating Period</b>	<b>Weekday</b>	<b>Saturday/Sunday/Holiday</b>
Non-operational	12:00 am - 4:00 am (4 hours)	12:00 am - 4:00 am (4 hours)
Base (AM)	4:00 am - 5:00 am (1 hour)	
Peak (AM)	5:00 am - 9:00 am (4 hours)	
Base (MID)	9:00 am - 3:00 pm (6 hours)	4:00 am - 9:00 pm (17 hours)
Peak (PM)	3:00 pm - 7:00 pm (4 hours)	
Base (PM)	7:00 pm - 9:00 pm (2 hours)	
Late	9:00 pm - 12:00 am (3 hours)	9:00 pm - 12:00 am (3 hours)

Transitions of the operating fleet size, i.e., insertion or removal of trains from passenger-carrying guideway sections, for changes in the operating periods, shall be made only in that period requiring the smaller fleet size.

All scheduled System maintenance that would interfere with or require reduced passenger service shall be accomplished during the non-operational or off-peak periods, unless otherwise authorized by the City. These operating periods and hours may be adjusted by the City to meet actual System ridership and operational requirements; however, the above schedule shall apply for all purposes in the Core Systems Contract, at least through the issuance of the Certificate of Substantial Completion for the System.

**TP-3.4.2.2 Headway**

Headway is the elapsed time between the same part of consecutive trains operating in the same direction on the same guideway, measured at any given point on the guideway. During all normal operations, all trains on the same route shall operate at continuous headways and all trains on different routes that share a common guideway track section shall also operate at continuous headway; both conditions shall meet the requirements of Section TP-8.

Special case definitions of headway are:

**Safe Separation Headway** – A two-train minimum headway based on ATC, braking, etc. that allows the following train to stop safely without a collision with the lead train. This is part of the ATP subsystem design in accordance with Section TP-8. Operations based on minimum safe separation headway will allow a given train's velocity versus distance profile to influence the velocity versus distance profile of following trains.

**Non-Interference Headway** - The minimum sustainable headway that does not result in any given train's velocity versus distance profile influencing any other train's velocity versus distance profile, regardless of the number of routes that may be in simultaneous operation (i.e., no inter-train performance interference). For purposes of this definition, all external interferences such as passenger-induced delays are assumed to not be present.

**Minimum Operating Headway** – The minimum operating headway involves multiple trains, station stops, normal disturbances, passenger interference, etc. and is for operational planning to “ensure” smooth normal operations without train bunching and unscheduled stopping on the guideway. The minimum operating headway shall not be less than 115% of the non-interference headway.

**Operating Headway** - The headway determined appropriate for planned scheduled operations to meet passenger demand.

The Safe Separation Headway and the Non-Interference Headway shall be used for carrying out System design but shall not be used in defining System operating performance such as the operational headway, line capacity and trip time.

Non-Interference Headway shall be proved by the Core Systems Contractor by simulation and subsequent test demonstrations on the System. The simulation methodology and results shall be documented and submitted in accordance with the System Performance and Failure Management Analysis of Section TP- 3.4.2.11. The test demonstration shall be according to a procedure accepted by HART and shall involve maximum-length trains launched and separated by the non-interference headway being demonstrated. The trains shall be required to complete all route circuits at least twice and each test demonstration shall not be less than one-hour duration. Station dwells shall be the nominal dwells specified in Section TP- 3.4.2.3.

The Operating Headway shall be used to calculate the System line capacity (Section TP-3.4.2.9), fleet size (Section TP-3.4.2.10) and predicted System performance (Section TP-3.4.2.11). The operating headway shall be greater than or equal to the minimum operating headway.

The minimum operating headway may be used to calculate System service performance.

The Core Systems Contractor shall design the System such that the specified System line capacity can be met with an operational headway not less than 180 seconds. Any capability of the Core Systems Contractor-supplied System to achieve a minimum operating headway less than 180 seconds shall be

provided by the Core Systems Contractor as reserve line capacity above the required System line capacity.

**Maximum Headways** - The operating headways shall be developed by the CSC for submission and acceptance by HART. The Operating Headways for the System shall not exceed the following:

**Table 5: Maximum Operating Headways**

<b>Operating Period</b>	<b>Weekday (minutes)</b>	<b>Saturday/ Sunday/Holiday (minutes)</b>
<b>Interim Operating Period #1</b>		
Non-operating	n/a	n/a
Base (AM)	n/a	n/a
Peak (AM)	10	n/a
Base (MID)	10	10
Peak (PM)	10	n/a
Base (PM)	n/a	n/a
Late	n/a	n/a
<b>Operating Period</b>	<b>Weekday (minutes)</b>	<b>Saturday/ Sunday/Holiday (minutes)</b>
<b>Interim Operating Period #2</b>		
Non-operating	n/a	n/a
Base (AM)	n/a	n/a
Peak (AM)	10	n/a
Base (MID)	10	10
Peak (PM)	10	n/a
Base (PM)	10	n/a
Late	15	15
<b>Operating Period</b>	<b>Weekday (minutes)</b>	<b>Saturday/ Sunday/Holiday (minutes)</b>
<b>Full O&amp;M Period</b>		
Non-operating	n/a	n/a
Base (AM)	10	
Peak (AM)	6	
Base (MID)	10	10
Peak (PM)	6	
Base (PM)	10	
Late	15	15

The maximum operating headways shall be the operating headways defined in Section 3.4.2.2.

**TP-3.4.2.3 Station Dwell Time**

Station dwell time is the time during which the train is stopped in the station, beginning at the time all doors (vehicle doors and platform gates) are commanded to open and ending at the time all doors and

gates are closed and locked. The dwell time for trains at each station shall be a minimum of 15 seconds adjustable in one (1) second increments up to a maximum of 180 seconds. Within this 165 second range, station dwell times shall be automatically adjustable by the ATS subsystem to achieve proper train spacing on the route, or manually adjusted by the Controller to provide dwell times that are appropriate for specific, short-term patronage or other conditions.

Nominal station dwell times for each station shall be calculated for all operating periods by the Core Systems Contractor on the basis of the following criteria, which shall all be satisfied:

- A. Vehicle loaded to the vehicle comfort load capacity ( $L_{\text{Comfort}}$ ), as defined in Section TP-3.4.2.8.
- B. At all stations, the following percentages of the vehicle comfort load capacity board and alight each vehicle:

Direction	Station Platform	Board	Alight
Turnback	East Kapolei	100 %	25 %
EB	UH West O'ahu	100 %	25 %
EB	Ho'o'pili	25 %	25 %
EB	West Loch	100 %	25 %
EB	Waipahu Transit Center	50 %	25 %
EB	Leeward Community College	25 %	25 %
EB	Pearl Highlands	100 %	25 %
EB	Pearl Ridge	75 %	50 %
EB	Aloha Stadium	75 %	25 %
EB	Pearl Harbor	25 %	50 %
EB	Honolulu International Airport	25 %	75 %
EB	Lagoon Drive	25 %	25 %
EB	Middle Street Transit Center	25 %	25 %
EB	Kalihi	25 %	50 %
EB	Kapalama	25 %	25 %
EB	Iwilei	25 %	25 %
EB	Chinatown	25 %	25 %
EB	Downtown	50 %	100 %
EB	Civic Center	25 %	75 %
EB	Kaka'ako	25 %	50 %
Turnback	Ala Moana Center	75 %	100 %
WB	Kaka'ako	25 %	25 %
WB	Civic Center	25 %	25 %
WB	Downtown	50 %	25 %
WB	Chinatown	25 %	25 %
WB	Iwilei	25 %	25 %
WB	Kapalama	25 %	25 %
WB	Kalihi	25 %	25 %
WB	Middle Street Transit Center	25 %	25 %
WB	Lagoon Drive	25 %	25 %
WB	Honolulu International Airport	25 %	25 %
WB	Pearl Harbor	25 %	50 %
WB	Aloha Stadium	25 %	25 %
WB	Pearl Ridge	25 %	25 %
WB	Pearl Highlands	50 %	25 %
WB	Leeward Community College	25 %	25 %
WB	Waipahu Transit Center	25 %	25 %
WB	West Loch	25 %	50 %
WB	Ho'o'pili	25 %	25 %
WB	UH West O'ahu	25 %	25 %

C. Vehicle door and platform screen automatic gate size shall represent actual dimensions of the specific technology employed by the Core Systems Contractor.

D. The passenger load/unload rate specified in Section TP-3.4.2.4 shall be used.



- E. A time allowance that represents actual equipment performance shall be included for all ATP interlock functions, plus vehicle door and platform screen automatic gate unlocking/opening and closing/locking times; this time allowance shall not include door or platform screen automatic gate fully-open time. Compatibility with the maximum door kinetic force requirements of TP 9, Section 25.3.23.5, shall be demonstrated. This allowance may not exceed ten seconds when platform screen gates are not implemented. However, with the implementation of platform screen gates, this allowance shall minimize, as much as possible, the impact on the overall dwell time. Such impact shall be subject to City review and approval.
- F. No station shall have a nominal doors or platform screen automatic gates fully-open period less than five (5) seconds.

These calculated nominal station dwell times shall be used to determine the operating headways of Section TP-3.4.2.2 and the round trip time requirements of Section TP-3.4.2.5.

#### **TP-3.4.2.4 Vehicle Loading/Unloading**

It shall be possible to completely unload a vehicle filled to the vehicle comfort load capacity ( $L_{\text{Comfort}}$ ), as defined in Section TP-3.4.2.8, in, preferably, 25 seconds or less, but not exceeding 28 seconds, through the doors on one side only, under the assumption that one passenger per second can be unloaded through each 25-inch unit of clear width at each doorway. For this calculation, the clear width of each doorway shall take into account any reduction in width due to stopping misalignment within the tolerances specified in Section TP-8, Section 34 44 00 for a normal programmed station stop. Doorway exit width shall be measured on a doorway basis; combining "extra" width from different doorways is not permitted. In calculating loading and unloading times, the effective clear width, in inches, of each doorway (as defined in Section TP-4) shall be divided by 25 inches and rounded downward to the nearest 0.1 units. The doorway width shall provide a minimum clear opening in accordance with Section TP-8, Section 34 44 10.

#### **TP-3.4.2.5 Travel and Round Trip Times**

Travel time between sequential stations on a route is the time a train takes to travel from one station to the next, beginning at the time all doors and gates are closed and locked at the originating station and ending at the time the train is stopped and all doors and gates are commanded to open at the destination station. Station dwell times are not included in travel times. There are no specified inter-station travel time requirements for the System.

The round trip time is the time a train takes to complete one circuit around its route. Round trip time consists of the sum of all travel times and station dwell times on a route. The round trip time for all trains on the route between the East Kapolei and Ala Moana Center stations shall not exceed 90 minutes.

For determination of the travel times and round trip time, the Core Systems Contractor shall assume station dwell times as defined in Section 3.4.2.3 and trains loaded at the AW2 weight specified in Section TP-4.

#### **TP-3.4.2.6 Cruise Speed**

The System shall demonstrate a minimum cruise speed of 55 mph.

#### TP-3.4.2.7 Vehicle Space Allocations

The following are vehicle passenger area allocations for the purposes of determining fleet size and other parameters required by this Section TP-3.

Total Passenger Area is defined as all of the area available to and intended for seated and standing passengers, and excludes areas occupied by equipment cupboards, draft screens, gangway bellows, control stations, racks, etc, which preclude passengers from occupying such areas.

The Standee Area is defined as the area available to standing passengers, includes the spaces in the gangways and multi-purpose areas for wheelchairs, etc., and excludes the areas occupied by seats in accordance with the following rules:

- A. Tip-up seats – exclude the floor area below the tip-up seat in the folded-up (not in use) position.
- B. Fixed Seats – for a group of one or more longitudinal (bench) seats, exclude the floor area taken by the seats as installed and a 305 mm [12 inch] deep foot room allowance in front of the seats extending the entire length of the group of seats.
- C. Fixed Seats – for groups of transverse knee to back seats, exclude the floor area taken by the seats as installed, the floor area between the rows of seats (installed in accordance with the seat spacing requirements specified in TP-4.4.3) and a 305 mm [12 inch] deep foot room allowance in front of the first row of seats for the entire length of that row.

A detailed calculation of the Standee Area shall be provided with sufficient detail to allow independent confirmation, including the following:

- Fully dimensioned vehicle floor area drawing(s) showing and calculating the Total Passenger Area with no seats installed;
- Individually fully dimensioned areas excluded from the Standee Area due to the installation of seats. These areas shall identify individual seat dimensions.

#### TP-3.4.2.8 Vehicle Capacity

The vehicle passenger capacity shall be determined based on the vehicle passenger area definitions of Section TP-3.4.2.7 and the provisions of this Section TP-3.4.2.8. Each vehicle shall comply with the accessibility provisions specified in Section TP-4. For the purposes of this Section TP-3, the following definitions of vehicle capacity shall be used:

**Vehicle Seating Load Capacity ( $L_{Seating}$ )** is the number of passenger seating spaces (not including wheelchair passengers), including any flip-up or stowable seats, within a vehicle. Each vehicle, or separate car of any permanently coupled set of cars, shall have a seating capacity of at least 20 percent of the vehicle design load capacity.

**Vehicle Design Load Capacity ( $L_{Design}$ )** is the number of passenger spaces within a vehicle represented by the sum of the passenger seating spaces, except flip-up and stowable seats, no wheelchair

passengers, no baggage, no surfboards, and no bicycles, plus the effective standee passenger spaces remaining, calculated at four (4) passengers per square meter.

**Vehicle Comfort Load Capacity ( $L_{\text{Comfort}}$ )** is the number of passenger spaces within a vehicle represented by the sum of the passenger seating spaces, except flip-up and stowable seats, no wheelchair passengers, no baggage, no surfboards, and no bicycles, plus the effective standee passenger spaces remaining, calculated at 3.2 passengers per square meter. In calculating vehicle design and comfort load capacities, the number of standing passengers shall be rounded downward to the nearest integer.

#### **TP-3.4.2.9 Line Capacity**

Line capacity is the number of passengers per hour per direction (pphpd) that can be carried past a given point on each independent route by trains operating on that route.

All of the line capacities specified in this Section shall be provided by trains that are:

- A. Operating in accordance with System operating hours specified in Section 3.4.2.1.
- B. Operating at the operating headway specified in Section 3.4.2.2.
- C. Operating with station dwell times calculated as specified in Section 3.4.2.3.
- D. Loaded at a vehicle comfort load capacity ( $L_{\text{Comfort}}$ ) as specified in Section TP-3.4.2.8.

The Initial System shall provide the following line capacity:

Peak period operations minimum line capacity: 7,200 pphpd  
Base period operations minimum line capacity: 3,600 pphpd  
Late period operations minimum line capacity: 2,100 pphpd

#### **TP-3.4.2.10 Fleet Size, Train Length and Spare Trains**

The Core Systems Contractor shall provide a fleet of trains sufficient to meet all requirements of the System operating during the first year of the Full O&M Period (refer to Section SP-4.1 for dates of O&M Periods), and in accordance with the following requirements.

##### **Peak Period Operating Fleet for the System**

The headway requirements of Section 3.4.2.2, the round trip time requirements of Section 3.4.2.5, and the line capacity requirements of Section 3.4.2.9 shall be used by the Core Systems Contractor to establish the size of the peak period operating fleet for the System so that all System requirements are met.

The Core Systems Contractor shall determine a peak period train fleet meeting the requirements of this Section 3.4.2.10.

The Core Systems Contractor shall provide a peak period train fleet meeting the requirements of this Section.

## **Spare Trains for the System**

In addition to the peak period operating fleet of trains specified herein, the Core Systems Contractor shall provide sufficient spare trains to meet System Service Availability and maintenance requirements. The number of spare trains shall be:

- A. Such that the average annual vehicle mileage is minimized and the vehicle design life of TP-4, "Passenger Vehicles" is met.
- B. At least one (1) train shall be kept as a spare and ready for service. A train will not be considered as a spare if it is disabled due to missing parts or defects that prevent that train from entering service within 2 hours or the train has an active priority I or II alarm as described in section 7.3.3.

## **Maximum Length Train**

The maximum length train for the System is approximately 240 feet in length. All equipment provided by the Core Systems Contractor for the System shall be sized to accommodate a maximum length train.

### **TP-3.4.2.11 System Performance and Failure Management Analysis**

To predict the performance of the System and to demonstrate analytical conformance with the requirements of this Contract, the Core Systems Contractor shall conduct the computer-based System Performance and Failure Management Analysis (SPFMA) described in this Section. The SPFMA shall accurately predict the operation of the Core System Contractor's trains operating on the System using mathematical techniques. The SPFMA shall be completed for the System assuming a semi-permanently coupled 4 car train unit loaded at the AW2 weight specified in TP-4, "Passenger Vehicles."

With respect to failure management, the SPFMA shall provide an analytical assessment of the failure operating modes of Section 3.4.3.2 and the failure management functions and strategies of Section 3.4.4 when these are applied to recover the System from train and or wayside equipment failures occurring on all guideway segments, and at each station platform, considered singly. It shall serve as a primary input to the System Operations Plan and Maintenance Plan to ensure that:

- A. Clear, unambiguous criteria are established for contact and communication between the Controller and the maintenance manager and/or responsible personnel.
- B. Clear, unambiguous criteria are developed for determining when and where maintenance personnel are dispatched.
- C. Clear, unambiguous criteria are developed for determining whether the disruption results from a wayside fault and for initiating the necessary repair or replacement and check-out operations.
- D. Clear, unambiguous criteria are developed for determining whether the disruption results from a vehicle fault and making the choice between manual operation, or coupling and pushing or pulling retrieval responses.

- E.** System designs include failure recovery features that limit the delays to other trains. The analysis shall include the determination of maximum delays due to isolated failures that block a track, such as a moveable failed train, and shall consider utilization of System features such as manual operation, manual coupling, push/pull recovery and strategically located storage tracks.
- F.** Control procedures provide a clear path and method for disposition of disabled trains, re-entry of recovery vehicles and equipment, and introduction of spare trains into the passenger-carrying guideway.
- G.** Passenger transfer from disabled trains is facilitated.
- H.** Clear, unambiguous criteria are established for recording/reporting the incident and assuring that necessary data are recorded for future use in computing System Service Availability.

Requirements for the SPFMA include:

**A. Input Parameters**

- 1. Predicted train performance characteristics, taking into account the weight, propulsion characteristics, aerodynamic drag characteristics and braking characteristics of the trains, and the ride comfort requirements of TP-4, "Passenger Vehicles."
- 2. Guideway characteristics of the route, including vertical and horizontal curves, switches, stations, and any speed restrictions.
- 3. Station dwell times resulting from application of the requirements of Section 3.4.2.3.
- 4. Reserved.
- 5. Headway restrictions in accordance with Section 3.4.2.2.
- 6. Train and wayside equipment failures on all guideway segments and at each station platform, considered singly.
- 7. The locations for guideway switches, storage tracks, and similar failure management facilities.

**B. Output Parameters.** The results of the SPFMA shall define System operating characteristics of the normal and failure management modes for the System, and shall include, as a minimum:

- 1. Round trip times and travel times between sequential stations.
- 2. Line capacities.
- 3. Station dwell times.
- 4. Operating headway.
- 5. Train velocity and time continuously presented as a function of route position.

6. The probability of, average duration of, and maximum delay to other trains for each type of failure on each guideway section and at each station platform.
7. The recommended set of failure management facilities and strategies.
8. A description of the proposed failure management modes/operations to meet the requirements of Sections 3.4.3.2 and 3.4.4.
9. The resulting headways and capacities provided for each failure operating mode during failure management operations.

As part of its SPFMA, the Core Systems Contractor shall provide detailed turnback analyses of the East Kapolei and Ala Moana terminals that show how AM peak train operations will be sustained for the first year of the Full O&M Period at those locations. As part of the analysis, actual and average operating headways shall be provided, including discussion on the use of alternating platforms, if appropriate, and whether any conflicts would exist in the Core Systems Contractor's scheduling of trains that hold trains short of any terminal or terminal crossovers/turnouts as part of the AM peak period service delivery operation at the terminal. The Core Systems Contractor shall provide an illustrated network analysis (stringline chart) of the entire round-trip, continuous operation for two hours of the AM peak for the first year of the Full O&M Period, and assume the civil configuration of the alignment and terminals provided as part of these Contract documents.

A preliminary SPFMA for the System shall be presented in the Core System Contractor's Technical Proposal. This shall include the failure management facilities and modes/routing capabilities for the System. After NTP, the Core Systems Contractor shall update the preliminary SPFMA based on actual System design, and submit a final SPFMA as part of the System Design Review. This performance shall be verified by acceptance testing without passengers prior to the System Demonstration.

#### **TP-3.4.3 System Operating Modes**

Operating modes shall include at least: (1) normal operating modes for peak, base, and late operating periods and (2) failure operating modes for failure management and unscheduled maintenance-related operations. The System shall operate in all of these modes as specified in this Section. When the system is operating in any mode other than normal mode, i.e. stopping at all stations, alternate public announcements and electronic messaging shall indicate to passengers which train is operating, stations it will be stopping at and any other pertinent information required by passengers to complete their transit trip.

##### **TP-3.4.3.1 Normal Operating Modes**

All normal operating modes shall be fully automatic and regulated operations. In these modes, the headway shall be regulated in accordance with TP-8, "Division 34 – Transportation." Actual station dwell times shall normally be determined by the ATO subsystem and shall be based on the nominal dwell times of Section 3.4.2.3. Dwell times shall be adjustable by the Controller through the use of manual overrides, as specified in TP-8, "Division 34 – Transportation." When normal movement of any train is impeded for any reason, including manual intervention, the ATS subsystem shall automatically, without Controller intervention, re-establish regulated operation by adjusting train speeds and/or station dwell times, as specified in TP-8, "Division 34 – Transportation." Currently-

assigned dwell time values shall be displayed to the Controller, as specified in TP-8, "Division 34 – Transportation."

### **Pinched Loop Mode**

The normal operating mode shall be the pinched loop operating mode, with trains operating between the two end stations of each route. All trains shall stop at each station on their route. At the end stations, the trains shall cross over to the other guideway lane for the reverse run. Dependent upon the placement of intermediate crossovers or turnbacks, it shall be possible to change the end station designation of any train before it begins its route from the end station at the other end of the line. Normal operations shall be in a counter-clockwise direction when viewed from above, with forward operations on the right-side lane of the dual-lane guideway.

### **Short Turnback Mode**

In this mode, portions of the System between two crossovers shall be temporarily set up and operated as truncated routes. Short turnback mode operation shall be initiated by the Controller, who shall select the two end stations to be served. The ATC system design shall provide for the operation of all possible short-turnback routes that the crossovers shown on the Informative Drawings will allow. The short-turnback mode shall be operable by itself or in conjunction with the pinched loop mode described in this Section 3.4.3.1.

### **Skip-Stop Mode**

The skip-stop mode shall be a fully automated, regulated operation that may be used during peak ridership periods. It shall operate trains in pinched loop service in accordance with this Section, except that not all station stops will be made. The specific skip-stop routes shall be predetermined and programmed into the ATS/ATO software. The Controller, with appropriate safeguards, shall be able to create additional skip-stop routes by selecting a different set of stations to be served. The skip-stop mode shall be operable by itself or in conjunction with the pinched loop or short-turnback operating modes described in this Section.

### **TP-3.4.3.2 Failure Operating Modes**

The Core Systems Contractor shall provide at least the following failure operating modes, primarily for failure management purposes and for unscheduled maintenance. Each failure operating mode shall be a fully automated and regulated operation which does not require manual intervention while operations are underway. All trains operating automatically in these failure operating modes shall be fully protected by the ATP subsystem (irrespective of the Controller's actions) in accordance with TP-8, "Division 34 – Transportation." The Core Systems Contractor shall use one or any combination of these failure modes if the station is inoperative. Initiation and control of these failure modes shall be in accordance with TP-8, "Division 34 – Transportation."

### **Shuttle Mode**

In this mode, a portion of the System shall be operated as a shuttle, where a single train remains on that lane and shuttles back and forth. The shuttle mode may be used to provide connecting service around a blockage to connect two short turnback operations. Shuttle mode operation shall be initiated by the Controller, who shall select the two end stations to be served.

### **Short Turnback Mode**

In this mode, portions of the System between two crossovers shall be temporarily set up and operated as truncated routes. Short turnback mode operation shall be initiated by the Controller, who shall select the two end stations to be served. The ATC system design shall provide for the operation of all possible short-turnback routes that the crossovers shown on the Informative Drawings will allow.

### **Skip-Stop Mode**

The skip-stop mode shall be a fully automated, regulated operation that may be used during peak ridership periods. It shall operate trains in pinched loop service in accordance with Section 3.4.3.1, except that not all station stops will be made. The specific skip-stop routes shall be predetermined and programmed into the ATS/ATO software. The Controller, with appropriate safeguards, shall be able to create additional skip-stop routes by selecting a different set of stations to be served.

### **Single-Tracking Mode**

In single-tracking mode, one or more sections of the guideway are excluded from the routes, and trains shall automatically be directed to by-pass such section or sections. This will result in bidirectional traffic on certain single lane guideway sections. Single-tracking mode shall be initiated by the Controller, who shall select the route trains shall follow. The ATC system design shall provide for the operation of single tracking on any single lane guideway section that the crossovers shown on the Informative Drawings will allow.

### **Multiple, Simultaneous Failure Modes**

The Failure Operating Modes described in this Section shall be operable simultaneously in any combination within the requirements of TP-8, "Division 34 – Transportation."

#### **TP-3.4.3.3 Operational Overrides and Adjustments**

It shall be possible to override and adjust the automatic operation of the System in all modes by commands from the operations control center in accordance with the requirements of TP-6, "Division 27 – Communications," and TP-8, "Division 34 - Transportation." When imposed, System overrides or adjustments, except for single, one-time train or station overrides, shall remain in effect until removed by the Controller.

#### **TP-3.4.4 Failure Management**

To respond to System failures and rapidly restore the System to full service, the following failure management strategies shall be provided, at a minimum. The Core Systems Contractor shall be responsible for defining and including any additional strategies to meet the System Service Availability requirements of Section 3.3. The Core System Contractor's specific plans for failure management shall be fully described in the System Operations Plan.

- A. The operations control center shall be able to detect and to reset minor anomalies and execute control functions as described in TP-6, "Division 27 – Communications," and TP-8, "Division 34 - Transportation."



- B. Each train shall be capable of manual operation, as described in TP-4, "Passenger Vehicles." This shall be implemented by means of a permanently installed manual control panel in each end vehicle. Remote manual train operation shall not be possible, regardless of the means of propulsion or control. In manual operation, the on board operator shall have direct control over all necessary train functions, and the Controller shall have no override control of any train functions. It shall be possible to operate a train manually in either direction. Manual train operations are specified in TP-4, "Passenger Vehicles." Each train shall have the capability to be operated by on board personnel to operate a train manually to push/pull any train of the same length up to and including a maximum length train. A train shall be switchable between the automatic and manual modes of operation only by a manual action performed on the train by authorized personnel. A change of status (automatic to manual and manual to automatic) shall be annunciated by an audible alarm at the operations control center, which shall require Controller acknowledgement to silence. It shall not be possible to effect a change-over between manual and automatic modes from the operations control center.
- C. The Core Systems Contractor shall propose adequate turnouts, crossovers, sidings, pocket tracks, and/or storage lanes along the line and beyond the end stations, space permitting, to facilitate the storage of reserve trains and failed trains. The locations and quantity of these crossovers and storage lanes shall be sufficient so that:
1. The maximum delay to operational trains due to a movable train failure, either by restarting the failed train or by pushing or pulling it by another train, will not be greater than 15 minutes, and
  2. The single-tracking mode of Section 3.4.3.2 can provide a line capacity of at least 50 percent of the line capacity specified in Section 3.4.2.9. In calculating the 50 percent line capacity under this section, the round trip time defined in Section 3.4.2.5 shall be adjusted by a delta to account for the increase or decrease in time that the train will take to make a round trip on the particular single-tracking mode. The failure mode performance for the locations of these features shall be confirmed in the SPFMA of Section 3.4.2.11.

#### **TP-3.4.4.1 Recovery of Stalled Trains**

The recovery of stalled trains shall be accomplished by the following actions.

- A. The Controller shall attempt to restart the stalled train remotely by issuing a command from the operations control center. The System shall be designed so that if the malfunction or condition that resulted in the stalled train no longer exists, the train shall respond to this command by automatically restarting and continuing in fully automatic service. This feature shall not apply to malfunctions that require a local reset or reset on board the train to restore fully automatic service, as specified elsewhere in these Technical Provisions. If the same or another malfunction or condition exists that prohibits the train from performing the command issued, a message shall be sent to the operations control center identifying the conditions prohibiting performance of the command.

- B. If the actions of A, above, are inappropriate or are not effective, operations or maintenance personnel, including at least one train driver-certified employee, shall be dispatched and reach the stalled train and/or inoperable guideway section within the time limits required by Section 3.7.3.C. They shall thoroughly check the train and/or guideway equipment and attempt to restart the train using on board or wayside reset devices.
- C. If the train cannot be restored to automatic operations, an operations or maintenance person shall manually drive it to the most convenient station using the on board controls. Passengers shall be offloaded at that station.
- D. As an alternative, or in addition to the actions of B and C, above, operations or maintenance personnel shall be dispatched to the train immediately in front of or behind the stalled train, which, normally after unloading its passengers at the most convenient station, shall be manually driven to the stalled train, coupled mechanically with it, then driven manually to push or pull the stalled train to the next station, where passengers shall alight. The stalled train shall then be removed from the operational guideway by pushing or pulling it with the recovery train. For reasons of safety, all such push/pull operations shall have an authorized operations or maintenance person at the front, given the direction of travel, of both the failed and the recovery trains for communications with each other and the operations control center.
- E. If it is not possible to advance the train manually to the station, and it cannot be pushed or pulled by an adjacent train, then as a last resort passengers shall be evacuated in accordance with TP-4, "Passenger Vehicles." In such a case, the Core Systems Contractor shall have sufficient personnel at the stalled train, evacuate passengers off the train, and move the passengers to a point of safety, all within 30 minutes (or longer if determined acceptable by a Hazard Analysis) after determining that evacuation of passengers off the train is necessary. After passengers have been evacuated safely from the guideway, a failure mode of Section 3.4.3.2 may be used to restore service while the failure is cleared. Train retrieval shall then be accomplished by using a recovery train, or by use of other support equipment, as needed.
- F. Certain train/vehicle or System equipment failures such as wheel lockup, broken axle, and power pick-up/rail damage, may result in lengthy System interruptions that are not correctable through the capabilities and procedures outlined above. Such events shall require use of one or more of the failure operating modes specified in Sections 3.4.3.2 until the failure is cleared.
- G. Within 15 minutes of OCC receiving a spontaneous evacuation request from a train, a driver-certified employee shall reach the affected train. This includes evacuation requests at any time of the day from trains located on yard tracks, out-of-service trains stored on the mainline, and in-service trains on the mainline. Failure to reach a train within this timeframe will result in any delay associated with the incident to be assigned to the Core Systems Contractor for the purpose of determining System Service Availability in Section 3.3.
- H. In the case of system-wide or similar outages that result in multiple spontaneous evacuations within the same timeframe or that result in multiple stopped trains outside of stations without evacuation requests and within the same timeframe, all on-duty service and station attendants shall reach affected trains in their zones within 15 minutes of the evacuation request being received at OCC or in the case of multiple stopped trains without evacuation requests, within

15 minutes of those trains coming to a stop. For the remainder of stopped trains outside of stations or with evacuation requests, the Core Systems Contractor shall provide as many additional employees as rapidly as possible to the affected trains. Such employees shall not be held to the 15-minute rule, but shall endeavor to reach those trains as quickly and safely as possible. This exception shall be acceptable only upon demonstration by the Core Systems Contractor of an acceptable hazards analysis and subsequent approval by the City.

Any failure management activity, such as any of the above stalled train recovery actions, shall include the Controller and/or other trained operations and maintenance personnel providing frequent and clear information and instructions to passengers, particularly those on the affected train(s) and station platform(s), using the train and station public address subsystems.

#### **TP-3.4.5 System Startup and Shutdown, Mode Transition, and Restart**

##### **TP-3.4.5.1 Start-up and Shutdown**

Prior to opening the System in automatic, driverless mode each morning, a patrol train shall proceed at restricted speed for an operator/attendant to visually "sweep" all mainline tracks for any obstacles or deficiencies. The System shall thereafter be started automatically by action of the Controller; after which trains shall be dispatched automatically into the passenger-carrying parts of the System. Consistent with operational requirements, trains shall assume positions along their assigned route(s) and be regulated prior to the required time to initiate service. As an alternative, trains in a ready state may be staged along the guideway prior to the initiation of service.

Prior to discontinuing System service, announcements to that effect shall be made in all stations and trains. Trains shall continue to operate until all passengers then on board complete their trips. Then train operations shall be terminated and O&M personnel shall visually verify by physical inspection at the last station at which each train stops that each train is empty of passengers. Trains may be staged along the guideway or routed to storage lanes prior to returning them to the yard for cleaning and maintenance.

##### **TP-3.4.5.2 Mode Transition and Train Adjustments**

Normal operating mode transitions and the insertion and removal of trains into and from passenger service shall be accomplished automatically by ATC commands initiated by the Controller and shall not require manual train operations. The System shall not be shut down to perform transitions or train changes. Service mode transitions in normal operations shall be completed within one round trip period.

Delays to any train enroute during these actions shall not exceed one scheduled headway in duration. Before a train is removed from service, appropriate announcements shall be made on that train and at each station it enters prior to its actual removal. If possible, the train to be removed shall continue to operate until all passengers on board at the first announcement have completed their trips. O&M personnel shall visually verify by physical inspection at the last station at which the train stops that each train is empty of passengers prior to its being taken out of service, as in Section 3.4.5.1.

Transitions between operating states and modes shall be measured for System Service Availability as specified in Section 3.3.

##### **TP-3.4.5.3 System Restart**

System restart refers to restoration of automatic System operations after an irregular System shutdown, partial or total. In this circumstance, train locations on the guideway are random as opposed to the controlled initialization status at System startup. System restart to automatic operations shall be initiated by Controller command subject to the following constraints:

- A. Procedural verification that the guideways are clear of all personnel, equipment, tools, and any obstacles.
- B. ATP subsystem functions are verified to afford total System movement protection per TP-8, "Division 34 – Transportation."

After verification of proper System performance, passenger service may then be resumed.

#### **TP-3.4.6 Summary of Baseline Service Plans**

The Baseline Service levels for the O&M Periods described in Section 3.1 and Section 3.4 are set forth in Tables 7, 8, and 9.

#### **TP-3.4.7 Baseline Service Requirements and Unexpected Ridership Growth**

##### **TP-3.4.7.1 Notification of Service Level Change**

The Core Systems Contractor shall continuously monitor actual ridership during the O&M Period and shall recommend changes to the Baseline Service levels to accommodate actual ridership. The City shall have the right to require a permanent increase or decrease to the Baseline Service levels, upon not less than 30 days' written notice to the Core Systems Contractor or shorter notice if responding to such shorter notice is reasonably feasible.

The City shall have the right to require a temporary increase or decrease to the Baseline Service levels to accommodate special events or other circumstances upon not less than 48 hours notice or less if responding to shorter notice is reasonably feasible and in accordance with such procedures as may be specified in the Operations Plan. Any additional trains required to accommodate a temporary increase in the Baseline Service levels will not be included in the calculation of System Service Availability, and if such temporary increase in Baseline Service levels has an adverse impact on System Service Availability as calculated in accordance with this paragraph, such circumstances will be taken into account in the application of the Availability Payment Factor under SP-6.

The Baseline Service levels shall first be revised in accordance with City-directed changes. The Operations Plan and the Maintenance Plan shall then be revised in accordance with the revised Baseline Service levels. The Operation and Maintenance Management Plan shall then be revised in accordance with the revised Operations Plan and the Maintenance Plan. All such revisions shall be made in accordance with Section 3.2.11 and SP-5. These revised Plans shall be submitted to the City for its review and acceptance.

##### **TP-3.4.7.2 Service Level Change of 20% or Less**

The monthly payments defined in the Contract will compensate the Core Systems Contractor for providing the agreed Baseline Service level throughout the O&M period. If temporary or permanent changes requested by the City result in the actual service provided exceeding or falling below the

defined Baseline Service levels by not more than 20 percent on a monthly basis, the payments shall be adjusted on a vehicle-mile base as stipulated in SP-6.

**TP-3.4.7.3 Service Level Change of Greater than 20%**

If the changes requested by the City result in a change to the actual service level beyond 20 percent on a monthly basis, the Core Systems Contractor and the City shall negotiate an appropriate change order in accordance with SP-5.

**TP-3.4.8 System Assurance Monitoring**

During all O&M Periods, the Core Systems Contractor shall conduct the program of operational data collection and analysis as contained in the most recent, City-accepted System Assurance Monitoring Plan (see Section 3.2.8). These data are to prove the actual performance of the System in passenger service and to verify System Service Availability requirements specified in Section 3.3 are met. The Core Systems Contractor shall submit to the City monthly System Assurance Monitoring Reports that include these data for review, commencing at the end of the first month of Intermediate O&M Period #1.

If, as a result of the System Assurance Monitoring, the Core Systems Contractor determines that modification, or redesign and/or replacement of any System components are necessary or desirable, the proposed method of accomplishing such modification, redesign and/or replacement shall be submitted to the City for review and approval prior to initiating such O&M Work. The costs for such modifications, redesigns and/or replacements required to meet the requirements specified in the Contract, which otherwise are not being met, or where such O&M Work is covered by the Warranty, shall be performed at Core Systems Contractor’s sole expense.

Table 6: Not Used

Table 7: Baseline Service Plans - Intermediate O&M Period

INTERMEDIATE O&M PERIODS								
	Intermediate O&M PERIOD #1				Intermediate O&M PERIOD #2			
In-Service Segment Between:	East Kapolei and Aloha Stadium				East Kapolei and Middle Street Transit Center			
Number of Stations:	9				13			
Normal Operating Mode:	Fully-automated pinched loop				Fully-automated pinched loop			
Minimum Peak Period Line Capacity (pphpd):	636				1,585			
Minimum Base Period Line Capacity (pphpd):	318				793			
Daily Operating Hours (Weekdays):	14				18			
Daily Operating Hours (Saturday):	10				18			
Daily Operating Hours (Sunday):	10				18			
Daily Operating Hours (Holiday):	10				18			
	DURATIO N (hours)	PERIOD	MAX HEADWA Y (minutes)	CONSIST (vehicles/ train)	DURATIO N (hours)	PERIOD	MAX HEADWA Y (minutes)	CONSIST (vehicles /train)

<b>Peak (AM):</b>								
<b>Base: (MID)</b>	14	5a-7p	10	4	16	5a-9p	10	4
<b>Peak (PM):</b>								
<b>Late:</b>					2	9p-11p	15	4
<b>Saturday, Sunday, and Holidays</b>								
<b>Base:</b>	10	8a-6p	10	4	16	5a-9p	10	4
<b>Late:</b>					2	9p-11p	15	4
<b>Eastbound Travel Time (min):</b>	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
<b>Westbound Travel Time (min):</b>	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
<b>Maximum Round Trip Time (min):</b>	45.00				65.00 (To Be Confirmed by CSC for approval by City)			
<b>Monthly Scheduled Vehicle Revenue Miles:</b>	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
<b>Peak Operating Fleet:</b>	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
<b>Spare Vehicles:</b>	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
<b>Total Fleet:</b>	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
<b>Notes:</b>	<p>1) Eastbound and Westbound Travel Times above shall include interstation travel times and station dwell times, and exclude recovery time at terminals.</p> <p>2) Maximum Round Trip Time above includes station dwell times, travel time between stations, and recovery time at the terminals.</p> <p>3) Saturday and Sunday service are the same. Service provided on state and federal holidays shall be the same as Saturday/Sunday service.</p> <p>4) The Core Systems Contractor shall determine the monthly scheduled vehicle revenue miles based on the National Transit Database reporting definition for (scheduled) "vehicle revenue miles".</p> <p>5) The Core Systems Contractor shall determine the train length (consist), peak operating fleet, spare vehicles, and total fleet in accordance with the Contract, Section TP-3, and this table.</p>							

Table 8: FULL O&M PERIOD

FULL O&M PERIOD																				
FULL O&M PERIOD #1		FULL O&M PERIOD #2				FULL O&M PERIOD #3				FULL O&M PERIOD #4				FULL O&M PERIOD #5						
In-Service Segment Between:		East Kapolei and Ala Moana Center				East Kapolei and Ala Moana Center				East Kapolei and Ala Moana Center				East Kapolei and Ala Moana Center						
Number of Stations:		21				21				21				21						
Normal Operating Mode:		Fully-automated pinched loop				Fully-automated pinched loop				Fully-automated pinched loop				Fully-automated pinched loop						
Minimum Peak Period Line Capacity (pphpd):		6,420				6,520				6,520				6,521						
Minimum Base Period Line Capacity (pphpd):		3,216				3,290				3,440				3,518						
Minimum Early/Late Period Line Capacity (pphpd):		1,875				1,819				1,903				2,007						
Daily Operating Hours (weekday):		20				20				20				20						
Daily Operating Hours (Saturday):		20				20				20				20						
Daily Operating Hours (Sunday):		20				20				20				20						
<b>Weekdays</b>																				
	DURATION (hours)	PERIOD	MAX HEADWAY (minutes)	CONSIST (vehicles/train)	DURATION (hours)	PERIOD	MAX HEADWAY (minutes)	CONSIST (vehicles/train)	DURATION (hours)	PERIOD	MAX HEADWAY (minutes)	CONSIST (vehicles/train)	DURATION (hours)	PERIOD	MAX HEADWAY (minutes)	CONSIST (vehicles/train)	DURATION (hours)	PERIOD	MAX HEADWAY (minutes)	CONSIST (vehicles/train)
Base (AM):	1	4a-5a	10	4	1	4a-5a	10	4	1	4a-5a	10	4	1	4a-5a	10	4	1	4a-5a	10	4
Peak (AM):	4	5a-9a	6	4	4	5a-9a	6	4	4	5a-9a	6	4	4	5a-9a	6	4	4	5a-9a	6	4
Base (MID):	6	9a-3p	10	4	6	9a-3p	10	4	6	9a-3p	10	4	6	9a-3p	10	4	6	9a-3p	10	4
Peak (PM):	4	3p-7p	6	4	4	3p-7p	6	4	4	3p-7p	6	4	4	3p-7p	6	4	4	3p-7p	6	4
Base (PM):	2	7p-9p	10	4	2	7p-9p	10	4	2	7p-9p	10	4	2	7p-9p	10	4	2	7p-9p	10	4
Late:	3	9p-12a	15	4	3	9p-12a	15	4	3	9p-12a	15	4	3	9p-12a	15	4	3	9p-12a	15	4
<b>Saturday, Sunday, and Holidays</b>																				
Base:	17	4a-9p	10	4	17	4a-9p	10	4	17	4a-9p	10	4	17	4a-9p	10	4	17	4a-9p	10	4
Late:	3	9p-12a	15	4	3	9p-12a	15	4	3	9p-12a	15	4	3	9p-12a	15	4	3	9p-12a	15	4
Eastbound Travel Time (min):	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
Westbound Travel Time (min):	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
Maximum Round Trip Time (min):	90:00				90:00				90:00				90:00				90:00			
Monthly Scheduled Vehicle Revenue Miles:	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
Peak Operating Fleet:	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
Spare Vehicles:	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
Total Fleet:	to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor				to be determined by Core Systems Contractor			
Notes:	1) Eastbound and Westbound Travel Times above shall include interstation travel times and station dwell times, and exclude recovery time at terminals. 2) Maximum Round Trip Time above includes station dwell times, travel time between stations, and recovery time at the terminals. 3) Saturday and Sunday service are the same. Service provided on state and federal holidays shall be the same as Saturday/Sunday service. 4) The Core Systems Contractor shall determine the monthly scheduled vehicle revenue miles based on the National Transit Database reporting definition for (scheduled) "vehicle revenue miles". 5) The Core Systems Contractor shall determine the actual operational headways, peak operating fleet, and spare vehicles in accordance with the Contract, Section TP-3, and this table.																			

Table 9: Baseline Service Plans - Optional O&M Period

OPTIONAL O&M PERIOD (years 6 to end of term)				
In-Service Segment Between:		East Kapolei and Ala Moana Center		
Number of Stations:		21		
Normal Operating Mode:		Fully-automated pinched loop		
Minimum Peak Period Line Capacity (pphpd):		7,181		
Minimum Base Period Line Capacity (pphpd):		3,591		
Minimum Early/Late Period Line Capacity (pphpd):		2,095		
Daily Operating Hours (weekday):		20		
Daily Operating Hours (Saturday):		20		
Daily Operating Hours (Sunday):		20		
<b>Weekdays</b>		DURATION (hours)	PERIOD	MAX HEADWAY (minutes)
Base (AM):		1	4a-5a	10
Peak (AM):		4	5a-9a	6
Base (MID):		6	9a-3p	10
Peak (PM):		4	3p-7p	6
Base (PM):		2	7p-9p	10
Late:		3	9p-12a	15
<b>Saturday, Sunday, and Holidays</b>				

<b>Base:</b>	17	4a-9p	10	4
<b>Late:</b>	3	9p-12a	15	4
<b>Eastbound Travel Time (min):</b>	to be determined by Core Systems Contractor			
<b>Westbound Travel Time (min):</b>	to be determined by Core Systems Contractor			
<b>Maximum Round Trip Time (min):</b>	90.00			
<b>Monthly Scheduled Vehicle Revenue Miles:</b>	to be determined by Core Systems Contractor			
<b>Peak Operating Fleet:</b>	to be determined by Core Systems Contractor			
<b>Spare Vehicles:</b>	to be determined by Core Systems Contractor			
<b>Total Fleet:</b>	to be determined by Core Systems Contractor			
<b>Notes:</b>				
1) Eastbound and Westbound Travel Times above shall include interstation travel times and station dwell times, and exclude recovery time at terminals.				
2) Maximum Round Trip Time above includes station dwell times, travel time between stations, and recovery time at the terminals.				
3) Saturday and Sunday service are the same. Service provided on state and federal holidays shall be the same as Saturday/Sunday service.				
4) The Core Systems Contractor shall determine the monthly scheduled vehicle revenue miles based on the National Transit Database reporting definition for (scheduled) "vehicle revenue miles".				
5) The Core Systems Contractor shall determine the train length (consist), peak operating fleet, spare vehicles, and total fleet in accordance with the Contract, Section TP-3, and this table.				

#### TP-3.4.9 Backup Bus Operations

The Core Systems Contractor shall provide System service whenever such service is scheduled and at least partial service if possible. Should the System have, or reasonably be expected to have, a full outage of greater than sixty (60) minutes, or a partial outage between not more than three stations of thirty (30) minutes (a partial outage involving more than three stations shall be treated as a full outage), the Core Systems Contractor shall immediately assess the probable duration of the outage and immediately notify the City of such projection. The City or a third-party bus provider (as decided by the City), will institute backup bus services.

In the event that backup bus services are instituted, the Core Systems Contractor shall initiate appropriate messages on the station variable message signs and audio messages in the stations to inform passengers of any delay, and when the back-up bus operation begins, to direct passengers to the bus stops. The Core Systems Contractor shall have staff at the entrances to the stations directing passengers to the bus stops.

During such bus operations, the System Availability shall be zero (0), which shall count toward the System Service Availability calculation of Section 3.3, unless the cause of the System outage is an exclusion, as described in Section 3.3.2.E.

#### TP-3.4.10 Verification of Sustained Operating System Performance

During the O&M period, the Core Systems Contractor shall annually conduct selected Operating System Acceptance Tests to assure compliant System performance. These tests shall be in addition to tests that are required on a routine basis by the Maintenance Plan. Such additional tests shall include but not be limited to:

- Ride Comfort requirements of TP-4, "Passenger Vehicles."
- Noise requirements of TP-4, "Passenger Vehicles."



- Travel Time requirements of Section TP-3.4.2.5.
- Vehicle door operations (door safety and closing forces) of TP-4, "Passenger Vehicles."
- The Core Systems Contractor shall address performance deficiencies disclosed in these periodic tests by correcting the cause of any measured deficiency and re-testing the specific item.
- Results of these periodic verifications shall be formally reported to the City within five days of any such testing. Reports shall address remedies for any shortfalls determined by these tests. These reports shall be completed and made available to the City at least three weeks prior to the submittal of the CARP report required by Section 3.6.

#### **TP-3.4.11 Special Services**

Upon the request of the City, the Core Systems Contractor shall provide special services in the operation of the System as follows:

- Adjust operating schedules for special events, upon at least three calendar days advance notice by the City.
- Accommodate special tours of the System.
- Conduct demonstrations of certain features of the System at the OCC or the maintenance facility.
- Conduct emergency preparedness and security exercises that involve the System, the City, and other agencies such as the Honolulu Police and Fire Departments, Honolulu, International Airport, and associated City, state, and federal agencies.

#### **TP-3.4.12 Operational Readiness Testing**

During the O&M period, the Core Systems Contractor shall conduct operational readiness testing as specified herein.

##### **TP-3.4.12.1 Objective of Readiness Testing**

Successful long-term operation of the System will require diligent effort by Core Systems Contractor personnel to assure a high level of operational readiness is maintained. During the O&M Planning and Design Support Period, failure management design features and operational procedures shall be developed for dealing with unplanned equipment and System outages, and procedures shall be finalized for the System Operations Plan. During the System Demonstration, these System features and operational procedures shall be demonstrated as a condition of Final Acceptance. It is imperative that steps be taken to assure the equipment and procedural skills developed for failure management not be allowed to diminish. Thus, the objective of these readiness testing requirements is to assure a high level of readiness is maintained throughout the O&M period. NFPA 130, Standard for Fixed Guideway Transit Systems, Latest Edition, Chapter 10, Emergency Procedures; 49 CFR Part 673; and related FTA documents shall be used as a guide for these requirements.

#### **TP-3.4.12.2 Frequency of Readiness Testing**

Except for the semi-annual system-wide drill (Section 3.4.12.5) all of the readiness tests described in this Section 3.4.12 shall be performed every three months throughout the O&M period. Tests shall be conducted to verify the proper operation of all of the Failure Operating Modes described in the Operations Plan. To avoid undue impacts on System passengers, these failure modes shall be tested during off-peak or non-operational periods. "Tabletop" drills may be conducted as alternatives to field drills if agreed by the City. The results of all such failure mode tests shall be recorded in a test report, and submitted to the City for review.

#### **TP-3.4.12.3 Testing of Operation Control Center (OCC) and Other Operations Personnel**

Operations control center personnel and other operations personnel shall be given operational readiness tests to verify their knowledge of the proper failure management responses. As part of these tests, it shall be possible for the Core Systems Contractor and/or the City to create test situations to which the person being tested must respond. These tests shall take the form of interviews and tests in which the employee's knowledge of proper operational procedures including failure management and emergency situation recovery, and troubleshooting activities is determined in a real-time, interactive situation.

The results of each test shall be quantified and a test score recorded. All test scores shall be made available to the City upon request and entered in the employee's permanent employment file. Where tests indicate a lack of proficiency on the part of the person tested, that person shall be provided with additional training and instruction. If, in the City's opinion, subsequent testing does not indicate improvement, the employee shall be removed from his/her position.

#### **TP-3.4.12.4 Testing of Maintenance Personnel**

All maintenance personnel whose duties involve responding to failure situations affecting passenger service shall be given operational readiness tests to verify their knowledge of the proper failure management responses. These tests shall take the form of interviews and tests in which the employee's knowledge of proper procedures is determined in a real-time, interactive situation. As part of this testing, the Core Systems Contractor shall also create test situations to which the person being tested must respond. These tests shall include all aspects of failure response, including communications, physical response to different locations throughout the System, proper diagnosis/response procedures, and proper deployment of equipment.

The results of each test shall be quantified, and a test score recorded. All maintenance personnel test scores shall be made available to the City upon request and entered in the employee's permanent employment file. Where tests indicate a lack of proficiency on the part of the person tested, that person shall, at the direction of the City, be provided with additional training and instruction. If, in the City's opinion, subsequent testing does not indicate improvement, the employee shall be removed from his/her position.

#### **TP-3.4.12.5 Readiness Drill**

Readiness drills shall be conducted at least annually. This drill shall be jointly planned in advance by a committee composed of the City; at least two Core Systems Contractor representatives, one of which shall lead the committee and organize the drill; and other local and state agencies. The objective of the readiness drill shall be to simulate a significant outage of the System that, if it were to occur in the real

world, would necessitate response by not only the Core Systems Contractor's System personnel, but also City and other agency emergency response resources. In leading the committee, the Core Systems Contractor shall develop meaningful exercises, including covert testing, that tests response effectiveness and coordination between the Core Systems Contractor, the City, and first responders. Plans for the readiness drill shall include minimizing impacts on System passengers and other members of the public.

The Core Systems Contractor shall send out the Readiness Drill plan and notice of the drill date 90 days in advance of the drill. If at the end of any operating year the readiness drill has not been undertaken due to the fault of the Core Systems Contractor, the compensation otherwise payable under the Contract shall be reduced in accordance with Section SP-6.22.

Actual field drills will be conducted at the request of the City. During these drills, all responses by the Core Systems Contractor, the City, and other local and state emergency services resources shall be as realistic as possible given drill conditions. Insofar as possible, all communications and physical response plans for dealing with an outage of the System shall be tested. As part of the readiness drill, drill observers provided by the Core Systems Contractor and the City shall be stationed to monitor and evaluate the responses of the various drill participants. The observations and conclusions of these observers shall be written down and presented for evaluation by the committee.

#### **TP-3.4.13 Passenger Services**

The Core Systems Contractor shall perform passenger services activities including the following services:

- Prompt response to passenger information queries and requests.
- Report and recordkeeping of passenger complaints.
- Response to passenger distress events with use of technology and shall include immediate response by nearby Core Systems Contractor personnel, as well as contacting appropriate public safety organizations via communications with the OCC. Included in this service shall be the Core System Contractor's response to disabled passengers prohibited from using stations due to out-of-service vertical circulation equipment. The Core Systems Contractor shall ensure that these passengers are provided timely ground transportation to/back from the next closest System station.
- Other reasonable passenger interaction as is necessary to enhance utility of the System, including the distribution of schedules, maps, and other documents providing passenger information.

The Core Systems Contractor shall have a database to track customer comments to determine trends, patterns or recurring problems (e.g., routes with schedule problems or employees identified with multiple complaints). Records of complaints and complaint responses shall be maintained and catalogued.

Complaint summaries shall be provided to the City on a monthly basis. Copies of specific complaint files shall be provided to the City upon request.

The Core Systems Contractor shall have procedures for supervisory/managerial staff to support the City in meeting with customers to resolve concerns or explain System procedures or conditions.

#### **TP-3.4.14 Fare Vending Operations**

##### **TP-3.4.14.1 Revenue Collection and Services**

Cleaning and janitorial of the fare gates and TVMs, shall be the responsibility of the Core Systems Contractor. The Core Systems Contractor must follow cleaning standards provided by the manufacturer and maintainer of the equipment.

Revenue servicing, including collection of cash from the TVMs and associated security will be the responsibility of the City. Revenue servicing by the City will include the following activities:

- A. Coin vault exchange
- B. Bill vault exchange
- C. Supplementary change storage units (auxiliary hopper) exchange
- D. Ticket stock reloading
- E. Audit ticket printing
- F. Receipt stock reloading
- G. Maintenance

The City, or the City's contractor, shall provide operating manuals and the necessary training of the Core System's Contractor's trainers, to allow the Core Systems Contractor to properly train its staff on the cleaning and operation of the TVMs and faregates.

##### **TP-3.4.14.2 Fare Communication and Control System Administration**

The City shall be responsible for administration of the Fare Communication and Control System (FCCS), and shall therefore be responsible for performing all activities required to maintain the FCCS performance requirements through the Term of the Contract. The Core Systems Contractor shall be responsible to maintain all power and communications systems (such as SCADA) necessary to provide support for the City's operations where such power and communications systems interface with the TVMs and related equipment within the Stations, Guideways and OCC. All alarms received at the OCC shall be promptly communicated to the City and/or such party designated by the City.

#### **TP-3.5 MAINTENANCE REQUIREMENTS**

The Core Systems Contractor shall provide all supervision, labor, materials, supplies, parts, and components necessary to maintain the System as specified herein on a continuous basis throughout the O&M period.

##### **TP-3.5.1 General**

All maintenance services on the System shall be performed by the Core Systems Contractor in accordance with the HART-accepted Maintenance Plan and Maintenance Manuals provided under the O&M Planning and Design Support Period, and augmented by the Core Systems Contractor for items not included in those documents. Updates to these Plans and Manuals shall be provided by the Core Systems Contractor to the City when material maintenance procedures are updated or changed from those set out in the then current Plans and Manuals, and at no additional cost to the City. When accepted by the City, these shall become the new basis for System, its facilities, and subsystem maintenance. No change to the accepted Maintenance Plan and Manuals shall be made without the City's acceptance.

At the termination of the Work, the Core Systems Contractor shall deliver to the City all copies of all manuals, drawings, computer programs, procedures, records, tools, equipment, and testing devices that the Core Systems Contractor has used to maintain the System equipment, facilities, and subsystems.

### **TP-3.5.2 Maintenance Duties**

The maintenance services shall include, but not be limited to: furnishing all labor, tools, equipment, parts and materials necessary to accomplish the inspection; cleaning; adjustment; preventive maintenance; lubrication; repair; testing; replacement of parts, components, and equipment; supplying spare parts, components, equipment, consumables, and expendables; and repair of spare equipment and facilities for the System, including but not limited to:

- All equipment and materials installed under the Core Systems Contract, including the Platform Screen Gate system and related equipment.
- All trackwork, track switches, traction electrification contact rail, and other wayside equipment required for the operations of the passenger trains.
- All equipment, materials, and facilities constructed and installed by the MSF Contract.

Maintenance shall be scheduled by the Core Systems Contractor to minimize the interference with, and effects upon, the operation of the System. To minimize operational impacts, maintenance of certain equipment and specified facilities might have to be accomplished during off-peak and non-operational periods, or off-site. The Core Systems Contractor shall not implement practices or procedures that may compromise or degrade System operations without prior written approval by the City.

Movements of trains under manual control shall be accomplished only by qualified Core Systems Contractor personnel who are authorized/certified to operate the trains, and then only under the rules and procedures specified in the appropriate manuals and the Rule Book.

#### **TP-3.5.2.1 Types of Maintenance**

For the System equipment, facilities, and subsystems, the following types of maintenance shall be performed.

**Routine Maintenance.** Routine maintenance includes activities required to provide a clean and aesthetically pleasing System for public use, as well as routine inspections and tests designed to identify

any unusual or abnormal equipment or facility conditions. Routine maintenance activities shall be as included in the Maintenance Plan and Manuals.

**Scheduled Maintenance.** Scheduled maintenance includes activities required to keep the System operating at prescribed levels of safety and reliability that are performed on a recurring basis at specified intervals. Scheduled maintenance activities shall be as included in the Maintenance Plan and Manuals, which shall cover all preventive maintenance, overhauls and other activities to be performed on or within the System.

**Non-scheduled Maintenance.** Non-scheduled maintenance includes any corrective measure or repair necessitated by an inspection, a failure, or unusual circumstances adversely affecting the normal System operations, or otherwise at the request of the City. Repair of vandalism and breakage shall be considered non-scheduled maintenance. Non-scheduled maintenance could be required as a result of unsatisfactory conditions discovered during an inspection or because of an operational failure. Non-scheduled maintenance activities shall be performed on a priority basis as necessary to meet required System Service Availability requirements and assure that safety and security requirements are met. Damage to surfaces of the facilities (maintained by CSC), vehicles, and equipment shall be corrected by repair or replacement that restores the surface to its original condition.

**Ordinary Wear and Tear.** Ordinary wear/tear includes any corrective measure or repair that may be required because of ordinary use, including but not limited to, painting, reupholstering, re-lamping light fixtures, re-flooring of vehicles, replacement of damaged glass, and all other materials restoration.

#### **Vandalism Repair/Replacement.**

The Core Systems Contractor shall be responsible for repair or replacement of facilities and equipment damaged through vandalism within stations (excluding escalators and elevators), on trains and within the non-public facilities maintained by the Core Systems Contractor. The City shall be responsible for repair or replacement of facilities and equipment damaged through vandalism on the guideway structure, station exteriors (including exterior glazing), station escalators and elevators and within the parking facilities.

**Other Maintenance.** Other maintenance includes maintaining updated Maintenance Manuals, maintenance testing as required, and maintenance of tools, equipment, and furniture.

#### **TP-3.5.2.2 Systems to be Maintained**

The Core Systems Contractor shall maintain all System Equipment, revenue and maintenance support vehicles, facilities, and subsystems and other works comprising the System including, but not be limited to:

- **Trains and all On-board Equipment** - The Core Systems Contractor shall inspect, service and maintain the entire fleet of trains and any special service and maintenance vehicles, including but not limited to: wheels, vehicle frame, structural members, vehicle exterior and interior, seats, windows, panels, doors, suspension equipment, propulsion and braking equipment, train control equipment, accessory equipment, door mechanisms, graphics, and air conditioning and ventilation equipment. The Core Systems Contractor shall also clean interiors

and exteriors of the vehicles and provide immediate cleaning and janitorial services for in-service trains.

- **Traction Electrification Equipment and Related Facilities-** The Core Systems Contractor shall clean, inspect, service, and maintain all traction electrification equipment, facilities, and associated systems. This shall include but not be limited to: substation facilities, TPSS facilities maintenance, primary and secondary switchgear, metering equipment, power circuit breakers, power transformers, power rails, grounding, wayside equipment, lightning and surge protection equipment, the alignment and adjustment of the power distribution rails on the guideway, housekeeping power, fire detection and suppression systems, air conditioning, SCADA/communications equipment, back-up generators, UPS equipment, and related security equipment. Acceptance tests used during the System Verification and Acceptance to prove compliance with the corrosion protection requirements (e.g., measurement for stray currents) and voltage of the ground rail with respect to earth ground shall be performed periodically to assure continuing compliance with the Core Systems Contract.
- **Command, Control, and Communications Equipment -** The Core Systems Contractor shall clean, inspect, service, and maintain the Operations Control Center (OCC), equipment and facilities, and associated system equipment and facilities housing such equipment remote from the OCC. This shall include, as a minimum: all ATC equipment, communications equipment, displays including CCTV, SCADA equipment, data processing equipment, housekeeping power, fire detection and suppression systems, all other alarm systems, air conditioning, communications, security, and facilities (equipment rooms, etc.) where such command, control, and communications equipment is housed. Routine tests shall be conducted on any equipment where safety margins used for design of the ATP may vary with use and/or time, such as brake response and performance, stopping distances, interlocks, speed and other detection devices, and vehicle door and platform screen automatic gate sensitive edges. All other subsystems shall be routinely tested in accordance with the manufacturer's recommendations and applicable codes.
- **Guideway, Trackwork and Right of Way (ROW)-** The Core Systems Contractor shall align, adjust and otherwise clean, inspect, service, and maintain all System equipment and materials located on the guideway, including but not limited to: normal and special trackwork, power rails, and antennas, poles, boxes as required to maintain integrity and service life and the specified ride quality and operation of the System. The Core Systems Contractor shall remove debris, litter and trash as necessary to ensure proper drainage and prevent opportunities for fires and other issues that could impact service. The Core Systems Contractor shall paint any wayside equipment as required to prevent corrosion and maintain an aesthetically pleasing appearance. Other guideway equipment to be inspected, serviced, and maintained by the Core System Contractor include, as a minimum: blue light stations, static signs, wayside equipment, walkway elements or appurtenances, rail fastening and grounding system, lighting, cable trays and conduit and storm drainage. Inspection, maintenance, and repair of the guideway infrastructure, guideway deck and parapet wall surface, guideway structural inspections, right of way grass cutting and landscaping, and tree trimming will be provided by the City or a City-contractor to be procured separately.

- **Stations and Station Equipment, including Platform Screen Automatic Gates - and Related Facilities** – The Core Systems Contractor shall operate and maintain as well as clean and provide janitorial services for all station facilities including interior and exterior glass cleaning, for all public and non-public areas located inside the whole of each station building including related overpasses, connectors, stairs and tunnels and outside of the stations within the limits shown in the Maintenance Area Plans. The Core Systems Contractor shall clean, inspect, service, and maintain all System equipment in the stations, including but not limited to: station and guideway intrusion systems, Platform Screen Gate system on both the platform side and the track side, passenger controls, communications, and dynamic and static signage provided under the Core Systems Contract, and other System equipment located in station equipment rooms, including any air conditioning equipment for those rooms. The Core Systems Contractor shall also provide immediate cleaning and janitorial services for all public areas of the stations including bathrooms. The Core Systems Contractor shall also provide cleaning and janitorial services for the City provided fare gates and TVMs and elevators and escalators.

Inspection, maintenance (excluding cleaning and janitorial provided by the Core Systems Contractor), and repair of the station infrastructure, bike racks or bike lockers, landscaping, tree trimming, pathways, walkways, pedestrian overpasses and underpasses (including structural inspections), curbs, stairways, lighting, handrails barriers, electro mechanical systems, HVAC, bathrooms, structural inspections, and station facility electro mechanical systems will be provided by the City or a City-contractor to be procured separately.

- **System Parking Lots and Related Facilities** - The Core Systems Contractor shall clean and provide janitorial services for the inside and outside of the public and non-public areas of all system parking lots and related parking facilities, including any kiss/park and ride facilities in the system within the limits shown in the Maintenance Area Plans. The Core Systems Contractor shall also provide immediate cleaning and janitorial services for all public areas of these facilities. The City will maintain the fare collection system for the parking lots and Pearl Highlands Garage.
- **Maintenance & Storage Facility (MSF) and Equipment** - The Core Systems Contractor shall clean, inspect, service, and maintain the MSF, including all facilities, equipment and grounds located at the MSF site within the limits shown in the Maintenance Area Plans. This Work shall include, but not be limited to: interiors and exteriors, all electrical and mechanical systems, electronic, communications, all signs and displays, roll up doors, employee facilities including locker rooms, break rooms and washrooms and other mechanical equipment and tools used for operating and maintaining the System, including the HVAC and plumbing systems, drains, ditches, access roads, parking lots surfaces and markings, interior and exterior lighting, fire systems, guard house, guard gates, landscaping, Structural inspections and wheel true equipment. This maintenance shall apply to all facilities at the MSF site, including but not limited to the Operations and Servicing Building (OSB), the Operations Control Center (OCC), the Maintenance of Way (MOW) facility, the train wash facility, and the wheel true facility.
- **O&M System Support Vehicles** - The Core Systems Contractor shall clean, inspect, service, and maintain all O&M track and road vehicles and maintenance and recovery vehicles (MRVs) in accordance with the recommendations of the manufacturers. The Core Systems Contractor shall register and license all road vehicles as required by the State of Hawaii.



- **Pavements and Grounds** - The Core Systems Contractor shall clean and maintain all pavement areas, sidewalks, and secured areas that are part of the non-public System areas within the limits shown in the Maintenance Area Plans. The Core Systems Contractor shall also maintain landscaping and irrigation systems within the MSF site and at other non-public building sites hosting Core Systems equipment. The Core Systems Contractor shall also clean and provide janitorial services for all pavement areas, sidewalks, and related grounds that are part of the public System areas at stations, parking lots and related station and parking facilities within the limits shown in the Maintenance Area Plans.. The Core Systems Contractor shall also provide immediate cleaning and janitorial services for all public areas of the pavement and grounds at stations, parking lots, and related station and parking facilities within the limits shown in the Maintenance Area Plans.

#### **TP-3.5.2.3 Fare Vending Equipment**

The City shall furnish all labor and materials (including spare parts and consumables) to ensure the highest possible availability for all fare vending equipment. The City shall be responsible for the proper maintenance and repair of all fare vending equipment and related materials.

The Core Systems Contractor shall be responsible for monitoring and responding to intrusion detection and tampering alarms sent to the Operations Control Center from the fare vending equipment and shall promptly report all such instances to the City and/or a party designated by the City.

#### **TP-3.5.2.4 Cleaning and Janitorial Services- General**

The Core Systems Contractor shall provide cleaning and janitorial (including graffiti removal) services for the System, including for all facilities at the MSF site; for the interior and exterior of public and non-public areas at all stations; for the interior and exterior of public and non-public areas at all System parking lots and related parking and kiss/park 'n' ride facilities; for all pavement areas, sidewalks, and grounds in non-public areas of the system; for all pavement areas, sidewalks, and related grounds that are part of the public System areas at stations, parking lots, and related station and parking facilities; for the interior guideway structure at track level; for all facilities housing System equipment; and for the interior and exterior of all vehicles. The City will be responsible for cleaning and janitorial services (including graffiti removal) for the exterior of the guideway structure and columns.

The Core Systems Contractor shall clean and provide janitorial services for immediate cleaning needs in the public areas at stations, parking lots and related parking facilities, any kiss/park 'n' ride facilities, and in the public pavement areas, sidewalks, and related grounds that are part of the System areas at those facilities. The Core Systems Contractor shall also clean and provide janitorial services for immediate cleaning needs on all in-service trains.

The Core Systems Contractor shall be responsible for cleaning the System equipment for which it is responsible to maintain, as per Section 3.5.2.2.

#### **TP-3.5.2.5 Cleaning and Janitorial Services - Station Facilities, Parking Facilities, and Vehicles**

The Core Systems Contractor shall clean and provide janitorial services (including graffiti removal) for the interior and exterior of all public and non-public areas of station facilities including fare vending machines and gates; System-related parking and kiss/park 'n' ride facilities; the pavement areas,

sidewalks, and related grounds of those facilities; and all vehicles as specified in these technical provisions, to at least the standards and frequencies specified in Table 10. The Core Systems Contractor shall review the table, and at least nine (9) months prior to the scheduled opening of Intermediate O&M Period #1, shall submit for HART approval a proposed revised list and details, including standards, frequencies, and repair/restore times of all cleaning/janitorial tasks to be undertaken. If the Core Systems Contractor fails to submit the revised list, HART may revise the list, which the Core Systems Contractor shall thereafter implement. The City will apply performance deductions against the average monthly payment, as specified in Section SP-6.22, when the standards or frequencies of performance for any HART-approved tasks falls below 95% of the standard or frequency associated with that task. The table of deductions in Section SP-6.22 will be updated upon HART approval of the revised list and details, and the total of all possible deductions will not exceed that as set forth in Section SP-6.22.

If any specific corrective cleaning action to be performed is not on the list, then the cleaning repair/restore time period shall be mutually agreed to by the Core Systems Contractor and the City, but shall not exceed 14 days without written approval from the City. If such corrective cleaning action is not performed within that time, the City may have the services performed and deduct the cost thereof from the Core Systems Contractor's payment in accordance with Section SP-6. Procedures associated with each category of cleaning shall be included in the System Maintenance Plan and the Maintenance Manuals.

The Core Systems Contractor shall adhere to the HART-approved System Maintenance Plan for all cleaning. All cleaning actions, including for those tasks included in the revised list of Table 10, shall be entered into the MMIS, scheduled, and assigned a work order for tracking purposes.

Deficiencies noted during any inspection, or which are otherwise brought to the attention of the Core Systems Contractor by the City or others shall be recorded on their inspection sheets, reported to OCC for entry into the Rapid Response Log, and if corrective action is needed, entered into the Core Systems Contractor's MMIS and assigned a work order for tracking purposes. Each corrective action work order shall have a designated time for completion based upon the revised list or the 14-day time period described herein.

The Core Systems Contractor shall have available 24 hours per day, for every day of System operations, rapid response personnel to initiate a rapid response to address events such as graffiti; spills, and other soils needing immediate attention. The term "initiate a rapid response" shall mean to identify and report the specific problems to OCC for logging into the Rapid Response Log, and promptly executing straightforward cleaning actions in accordance with the response times specified in Table 10.

The Core Systems Contractor shall report to the City each month the actual cleaning actions performed vs. the frequencies on the revised list, including the times of discovery of deficiencies and their associated times of resolution. The reporting shall also contain the same information for corrective cleaning actions not included on the revised list.

The Core Systems Contractor shall provide an audit form consistent with the final Table 10 and shall use the form to conduct periodic internal audits in accordance with the accepted *Maintenance Plan* to verify compliance with the minimum cleaning requirements. The Core Systems Contractor shall include the results of the periodic internal audits to the City with the monthly *System Assurance Monitoring Report*.

The City may audit the Core Systems Contractor's cleaning performance using the Core Systems Contractor's audit form. The City will provide no less than two (2) hours prior notice of such audit.

**Table 10: Minimum Cleaning Requirements - Station and Parking Facilities, and Vehicles**

<b>TASK</b>		<b>Required Frequency</b>
<b>A.</b>	<b>Janitorial Services at Station and Parking Facilities</b>	
1.	Clean restrooms.	Daily
a.	Replenish restroom paper supplies.	Daily
b.	Clean and sanitize sinks, counters, ledges, toilets and urinals.	Daily
c.	Damp mop floors. Daily	Daily
d.	Spot clean walls, partitions and remove graffiti. Daily	Daily
e.	Clean mirrors.	Daily
f.	Fill soap dispensers and odor control devices.	Daily
g.	Empty trash containers & install new plastic bags.	Daily
h.	Clean all fixtures and dispensers, including trash receptacles.	Daily
2.	Deep clean restrooms, including:	Weekly
a.	Burnishing or buffing floors.	Weekly
b.	Wash down and disinfect walls, partitions, and doors.	Weekly
c.	Re-finishing, laying, finish on floors.	Quarterly
3.	Clean skylight glass and elevator glass.	Quarterly
4.	Empty all trash containers.	Daily
5.	Maintain and replace damaged trash containers.	Weekly
6.	Wipe down covers and lid of trash containers to keep them clean.	Daily
7.	Clean and disinfect elevators and escalators.	Daily
8.	Provide for trash management (trains shall not be used for trash pickup or transportation)	Daily
9.	Gum removal.	Daily
<b>B.</b>	<b>Station Facilities and Equipment - Interior</b>	
1.	Sweep floors and stairways.	Daily
2.	Mop floors and stairways.	Weekly
3.	Scrub floors and stairways (mechanical).	Monthly
4.	Light clean walls (to 6 feet above floor), railings, ceilings (spot), and ledges.	Weekly
5.	Heavy clean walls (full height), railings, ceilings, and ledges.	Semi-annual
6.	Light clean windows/windowsills, glazing, and stainless finishes, including platform side and track side of Platform Screen Gate system and end of platform gates	Weekly
6a.	Clean windows/windowsills, glazing, and stainless finishes, including platform side and track side of Platform Screen Gate system and end of platform gates	Monthly
7.	Clean light fixtures and assemblies.	Monthly
8.	Clean passenger equipment.	Weekly
9.	Clean advertising/directories/map cases/signs.	Weekly
10.	Clean air conditioning and other ventilation units.	Weekly
11.	Clean station area of guideway of debris and soils.	Daily

<b>C.</b>	<b>Station Facilities and Equipment - Exterior</b>	
1.	Sweep patio and entrance/exit areas.	Daily
2.	Wet mop patio and entrance/exit areas.	Weekly
3.	Scrub floors of patios and entrance/exit areas (mechanical).	Monthly
4.	Light clean walls (to 6 feet above floor), railings, and ledges.	Weekly
5.	Heavy clean walls (full height), railings, and ledges.	Semi-annual
6.	Clean windows/windowsills, glazing, and stainless finishes.	Monthly
7.	Clean light fixtures and assemblies.	Monthly
8.	Clean passenger equipment.	Weekly
9.	Clean advertising/directories/map cases/signs.	Weekly
10.	Sweep all frontages, sidewalks, crosswalks, pavements, and grounds	Daily
<b>D.</b>	<b>System Parking Lots and Related System Parking Facilities</b>	
1.	Sweep floors and stairways (mechanical).	Weekly
2.	Heavy clean walls (full height), railings, ceilings, and ledges.	Semi-annual
3.	Clean windows/windowsills, glazing, and stainless finishes.	Monthly
4.	Clean light fixtures and assemblies.	Monthly
5.	Clean passenger equipment.	Weekly
6.	Clean advertising/directories/map cases/signs.	Weekly
7.	Sweep all frontages, sidewalks, crosswalks, pavements, and grounds.	Daily
<b>E.</b>	<b>Vehicles</b>	
1.	Clean exteriors.	Weekly
2.	Clean interiors.	Daily
3.	Trash and litter pickup.	Twice daily upon completion of peak periods
4.	Heavy cleaning.	Every 60 days
<b>F.</b>	<b>Immediate Cleaning - Public Areas of Stations, Parking Facilities, and Vehicles</b>	
1.	Clean all in-service on-vehicle spills, results of illness, other soils, and graffiti.	Within 30 minutes of identification
2.	Clean all spills, results of illness, and other soils in stations and parking facilities.	Within 2 hours of identification
3.	Remove or paint over graffiti in stations and parking facilities to comply with the initial design requirements.	Within 24 hours of identification
4.	Clean and dry or block off wet floors at stations and parking facilities.	Within 2 hours of identification.

**TP-3.5.2.6 Treatment of Effluents, Environmental, Permits and reporting**

The Core Systems Contractor shall treat all effluents discharged into the sanitary sewer system in an environmentally responsible manner that conforms to all applicable Governmental Rules. The Core

Systems Contractor shall comply with local sanitary sewer regulations with regard to pre-treatment of discharges. The Core Systems Contractor shall provide for the pick-up and processing of treated effluent that cannot be discharged into the sewer system. Additionally, the Core System Contractor is responsible for following all applicable Federal, State and local Environmental and Permitting/reporting requirements.

Any permits required by City, State, or Federal agencies for the Core Systems Contractor to perform maintenance will be obtained by the Core Systems Contractor in advance of any work performed.

#### **TP-3.5.2.7 Maintenance Tools and Equipment**

The inventory of tools, maintenance equipment, test equipment and facilities furnished under the Core Systems Contract shall be maintained in good order and repaired or replaced by the Core Systems Contractor as necessary to maintain the inventory. Records of this inventory shall be kept by the Core Systems Contractor. Continuously during the O&M period, including at the time of expiration, the complete inventory of tools, maintenance equipment and test equipment shall exist or be replenished by the Core Systems Contractor, including any replacement of and/or repair in good condition of any tools, maintenance equipment and test equipment. The MMIS shall be used to track these inventories and ensure their configuration control.

If at any time during the O&M period the required inventory of tools, maintenance equipment and test equipment is found to be deficient for performing the services, then the Core Systems Contractor shall provide the additional those items at no cost to the City.

#### **TP-3.5.2.8 MSF Site Facilities and Infrastructure Maintenance Performance Requirements**

The Core Systems Contractor shall clean and maintain the facilities and infrastructure within the limits of the MSF site as specified in these technical provisions to at least the standards and frequencies specified in Table 11. The Core Systems Contractor shall review the table, and at least nine (9) months prior to scheduled occupancy of the MSF, shall submit for HART approval a proposed revised list and details, including standards, frequencies, and repair/restore times of all MSF site facilities and infrastructure maintenance to be undertaken for all of the maintenance types specified in Section 3.5.2.1. If the Core Systems Contractor fails to submit the revised list, HART may revise the list based on maintenance plans and other updated information received, which the Core Systems Contractor shall thereafter implement. The City will apply performance deductions against the average monthly payment, as specified in Section SP-6.22, when the standards or frequencies of performance for HART-approved tasks falls below 95% of the standard or frequency associated with that task. The table of deductions in Section SP-6.22 will be updated upon City approval of the revised list and details, and the total of all possible deductions will not exceed that as set forth in Section SP-6.22.

If any specific corrective action to be performed is not on the list, then the repair and restore time period shall be mutually agreed to by the Core Systems Contractor and the City, but shall not exceed 90 days without written approval from the City. If such corrective action is not performed within that time, the City may have the services performed and deduct the cost thereof from the Core Systems Contractor's payment in accordance with SP-6.

Procedures associated with each category of facilities maintenance shall be included in the System Maintenance Plan and the Maintenance Manuals. The Core Systems Contractor shall adhere to HART approved System Maintenance Plan for all MSF site facilities and infrastructure cleaning and

maintenance. All maintenance actions, including for those tasks included in the revised list of Table 11, shall be entered into the MMIS, scheduled, and assigned a work order for tracking purposes.

Deficiencies noted during any inspection, or which are otherwise brought to the attention of the Core Systems Contractor by the City or others shall be recorded on their inspection sheets, and if corrective action is needed, entered into the Core Systems Contractor's MMIS and assigned a work order for tracking purposes. Each corrective action work order shall have a designated time for completion based upon the revised list or the 90-day time period described herein.

The Core Systems Contractor shall report to the City each month the actual maintenance performed vs. the frequencies on the revised list, including the times of discovery of deficiencies and their associated times of resolution. The reporting shall also contain the same information for corrective actions not included on the revised list.

The Core Systems Contractor shall provide an audit form consistent with the final Table 11 and shall use the form to conduct periodic internal audits in accordance with the accepted *Maintenance Plan* to verify compliance with the minimum maintenance requirements. The Core Systems Contractor shall include the results of the periodic internal audits to the City with the monthly *System Assurance Monitoring Report*.

The City may audit the Core Systems Contractor's facilities maintenance performance using the Core Systems Contractor's audit form. The City will provide no less than two (2) hours prior notice of such audit.

**TP-3.5.2.9 Electromagnetic Compatibility Monitoring**

The Core Systems Contractor shall monitor the System to confirm adherence to regulations, approvals, and environmental performance standards. Incidents of non-compliance noted during monitoring conducted by the Core Systems Contractor shall be field-reviewed by the Core Systems Contractor's General Manager.

The Core Systems Contractor shall determine the frequency of monitoring depending upon the level of activity, proximity of activity to sensitive resources, and the environmental issues associated with the Work location. Monitoring is to occur at a frequency adequate to confirm ongoing compliance with the Contract requirements, and shall be incorporated into the Core Systems Contractor's System Maintenance Plan, as described in Section TP-3.2.2.

In the event an incident of noncompliance is noted, the Core Systems Contractor shall be immediately reported to the City. The Core Systems Contractor shall determine corrective measures and to establish the earliest feasible time frame for implementation of the corrective measures. Implementation of the corrective measures is to be documented during subsequent inspections. Monitoring reports are to be completed within 14 Calendar Days of each monitoring inspection.

**Table 11: Minimum MSF Maintenance Requirements**

TASK		Required Frequency
<b>A.</b>	<b>Janitorial Services at Building and Parking Facilities</b>	
1.	Clean and maintain restrooms and locker rooms.	Daily
a.	Replenish restroom paper supplies.	Daily

b.	Clean and sanitize sinks, counters, ledges, toilets and urinals.	Daily
c.	Damp mop floors.	Daily
d.	Spot clean walls, partitions and remove graffiti.	Daily
e.	Clean mirrors.	Daily
f.	Fill soap dispensers and odor control devices.	Daily
g.	Empty trash containers & install new plastic bags.	Daily
h.	Clean all fixtures and dispensers, including trash receptacles.	Daily
2.	Deep clean restrooms and locker rooms including:	Weekly
a.	Burnishing or buffing floors.	Weekly
b.	Wash down and disinfect walls, partitions, and doors.	Weekly
c.	Re-finishing, laying, finish on floors.	Quarterly
3.	Clean skylight glass and elevator glass.	Quarterly
4.	Empty all trash containers.	Daily
5.	Maintain and replace damaged trash containers.	Weekly
6.	Wipe down covers and lid of trash containers to keep them clean.	Daily
7.	Clean and disinfect elevators.	Daily
8.	Provide for litter pick-up.	Daily
9.	Gum removal.	Daily
<b>B.</b>	<b>Hardscapes and Softscapes</b>	
1.	Maintain irrigation system.	Monthly
2.	Remove weeds, mow, and edge.	Weekly
3.	Remove paper, litter, gum and other trash and debris.	Daily
<b>C.</b>	<b>Heating, Ventilation and Air Conditioning</b>	
1.	Service and maintain all HVAC systems. Quarterly	Quarterly
2.	Repair and/or replace all non-operational HVAC systems.	Within 3 hours of identification
<b>D.</b>	<b>Lighting and Facilities Electrical</b>	
1.	Clean fixtures Monthly	Monthly
2.	Replace burned out light bulbs	Within 24 hours of identification
<b>E.</b>	<b>Plumbing</b>	
1.	Maintain toilets, urinals, sinks, drinking fountains, sump pumps, and related plumbing equipment and fixtures.	Quarterly
2.	Maintain and rod-out all clean outs.	Quarterly
3.	Maintain and rod-out all storm water catch basins and outflow lines.	Monthly
4.	Clear clogged sewer lines.	Within 3 hours of identification
<b>F.</b>	<b>Signage and Boards</b>	
1.	Clean and maintain signs.	Weekly

2.	Replace lighting sources for illuminated signs.	Within 24 hours of identification
3.	Repair damaged signs.	Within 24 hours of identification
4.	Replace damaged signs.	Within 24 hours of discovery of identification
5.	Lock and secure all panels.	Within 2 hours of discovery of identification
<b>G.</b>	<b>Glass and Glazing</b>	
1.	Secure and replace broken glass.	Within ½ hour of identification
2.	Repair and/or replace fractured and scratched glass.	Within 24 hours of identification
<b>H.</b>	<b>Pest Control</b>	
1.	Provide pest control, including pigeon control services and treatment for vermin.	Monthly
<b>I.</b>	<b>Graffiti and Vandalism</b>	
1.	Remove or paint over graffiti to comply with the initial design requirements.	Within 2 hours of identification
2.	Repair damage due to vandalism to comply with the initial design requirements.	Within 2 hours of identification
<b>J.</b>	<b>Surface Parking</b>	
1.	Sweep and/or vacuum all surface parking areas.	Bi-weekly
2.	Power scrub the parking surface.	Quarterly
3.	Re-stripe all surface parking.	Every 2 years.
4.	Slurry seal all surface parking.	Every 10 years
5.	Repair potholes and similar damaged pavement.	Every 5 years
<b>K.</b>	<b>Cleaning Non-Light Metro Vehicle Building Areas</b>	
1.	Clean, sweep, hose, scrub and rinse the non-light metro vehicle areas of buildings.	Monthly
<b>L.</b>	<b>Elevator Maintenance</b>	
1.	Maintain elevators in accordance with manufacturer's recommended maintenance program and specified operating requirements.	Monthly
<b>M.</b>	<b>Control Centers and All Other Administrative Offices</b>	
1.	Clean the Control Centers and all administrative offices within buildings.	Daily
<b>N.</b>	<b>Traction Power Substations and Equipment Rooms</b>	



1.	Clean all traction power substations and System equipment rooms.	Weekly
<b>O.</b>	<b>Rail Areas</b>	
1.	Remove litter and clean all rail areas. Remove deposits of foreign materials in a timely manner	Daily
<b>P</b>	<b>Building Exteriors</b>	
1.	Clean windows	Monthly
2.	Maintain and clean building envelope	
a.	Wash entire building exterior	Every 1 year
b.	Re-caulk deteriorated control joints	Every 5 years
c.	Maintain and repair damaged coping, flashing and other waterproofing provisions.	Within 48 hours of identification
d.	Maintain and repair roofing systems.	Every 1 year
<b>Q</b>	<b>Building Interiors</b>	
1.	Paint walls.	Every 5 years
2.	Replace carpet and other floor coverings subject to wear.	Every 5 years

### TP-3.5.3 Dependability Monitoring and Epidemic Failures

The City shall have the right during the O&M Period to have any failed item disassembled, photographed and documented by any means necessary in order to permit examination and analysis of the failure jointly with the Core Systems Contractor. The cause of the failure will be categorized to determine if corrective action by the Core Systems Contractor should be in the area of design, quality, materials selection, maintenance actions or operating practices or procedures. When the corrective action that is appropriate has been implemented by the Core Systems Contractor, a monitoring period will be instituted to assure the corrective action has been effective. If the monitoring period produces favorable results, the corrective action will be deemed appropriate. If the monitoring period does not produce favorable results, the Core Systems Contractor shall repeat the joint examination and analysis portion of the program again.

In the event that component failures exceed 10 percent of the total of such components used for the same function in the same system during the warranty period in any 12 month period, the failures shall be considered to be epidemic. Computation of epidemic failure shall be made from the date of occurrence of the second failure of the component.

Upon identification of a case of epidemic failure, the Core Systems Contractor shall promptly undertake a system-wide modification program to inspect, modify or replace all such components as required, as well as prevent the occurrence of the same defect in any other systems still under manufacture under this contract. The modification program shall begin no later than 30 days after each case is identified. All engineering changes required for rectification of epidemic failures shall be reviewed by the City.

### TP-3.5.4 System Support Vehicles

#### TP-3.5.4.1 Maintenance and Recovery Vehicles

The Core Systems Contractor shall provide the necessary road and guideway-based maintenance and recovery vehicles (MRVs) to: (1) inspect, clean and maintain the guideways, guideway equipment and station equipment, including the Platform Screen Gate system equipment; (2) retrieve failed trains

anywhere on the guideway; and (3) move vehicles and trains in the M&SF. The Core Systems Contractor shall determine the number and type of MRVs needed by refining the included MRVs list, and submit supporting information, including the design, capabilities, and related equipment to HART for review and acceptance as part of the Maintenance Equipment Design Review. If, during the O&M period, the City determines that there are insufficient MRVs to meet operational, maintenance and System Service Availability requirements, the Core Systems Contractor shall provide the necessary additional MRVs of the appropriate type at no extra cost to the City.

The MRVs shall:

1. Be bidirectional with equal performance in both directions and be operable by its own energy source, except that gasoline power shall not be permitted and diesel power shall have air pollution control equipment.
2. Couple with any maximum length train loaded at AWO, then push, pull, and stop the train over the entire guideway length for an indefinite period of time in all specified environmental conditions. While the MRVs shall have such push-pull capability, they shall not normally be used for failure management.
3. Carry replacement parts for maintaining and repairing guideway and/or wayside equipment.
4. Carry jacking and/or re-railing equipment for vehicle/train recovery.
5. Have the means, such as a permanent or detachable crane or winch, to place/remove tracks, track switches, wayside equipment, jacking, and re-railing equipment on/from the guideway.
6. Generate compressed air and 120 and 240 volt ac auxiliary power.
7. Have onboard storage for selected maintenance equipment and parts.
8. Be able to operate on all sections of System guideway under all specified environmental conditions.
9. Be retained on the guideway in a manner that satisfies the requirements of this Section. It shall have any necessary additional stabilizing devices to prevent tipping and/or derailment while performing any guideway maintenance and/or train recovery functions.
10. Be detectable (including any trailers) by the ATP system, but shall not be required to be subject to all ATP restrictions. For any operation on the passenger carrying guideways during periods where the System is in passenger service its speed shall be automatically limited to 10 mph. Higher operating speeds for the MRVs may be permitted subject to acceptance by the City.
11. Have onboard radio communications satisfying the requirements of TP-6, "Division 27 – Communications."
12. Have environmentally controlled cabs.
13. Have light sources mounted on the MRVs to assist O&M activities.
14. Be capable of operation on the road where an MRV's functionality is relevant for both guideway and road use.

Where different types of MRVs are provided for different purposes, all MRVs shall, at a minimum, have the features required by Paragraphs 1, 6, and 7 through 14 above.

Any MRV, by itself or with trailers, when fully loaded for any of its functions shall not exceed the load limits established for the guideway structure or of any guideway equipment, including guidance and running surfaces. Guideway-related structural analyses submitted by the Core Systems Contractor to HART shall include this vehicle loading condition.

#### **TP-3.5.4.2 Other O&M Vehicles**

The Core Systems Contractor shall provide a sufficient number of commercial road-based vehicles to conduct all operations and maintenance tasks required by the Contract, including, at a minimum:

1. Transport of O&M personnel to any System location to support routine operations of the System.
2. Rapid access of O&M personnel to any System location to respond to failures, malfunctions, and to perform routine maintenance.
3. Pick-up and delivery of O&M equipment, parts, consumables, and expendables.
4. Transport of disabled passengers among stations within the System when those passengers are not able to use a station due to out-of-service vertical circulation equipment.

The Core Systems Contractor shall determine the number and type of Other O&M vehicles needed by refining the included Other O&M vehicles list in Section 3.5.4.4.

These vehicles shall be of heavy-duty construction and be suited to and equipped for the purposes intended by the Core Systems Contractor. All such vehicles shall meet US and State motor vehicle codes and requirements, and shall be licensed in the State of Hawai'i. Use of energy-efficient vehicles shall comply with SP-18.3. All shall have an appropriate color scheme, markings, logos, and similar features to identify them as a System vehicle. They shall have flashing amber strobe lights mounted for visibility by other motorists. All shall have on board mobile radios, or integral mounts for hand-held portable radios, to give full coverage wherever they are driven in the course of their duties, and access to the O&M radio communications subsystem in accordance with TP-6, "Division 27 – Communications."

#### **TP-3.5.4.3 Maintenance and Recovery Vehicles List**

1. Rescue vehicle
2. Track inspection/service/work train
3. Rail 15-ton flatbed trailer
4. Rail grinder
5. Tamper
6. Sperry (geometry) car
7. Hi-reach lift truck
8. Rail car mover (go-car)
9. Enclosed trailer containing re-railing equipment

#### **TP-3.5.4.4 Other O&M Vehicles List**

1. Five (5) automobiles for General Manager and related management staff
2. Five (5) automobiles for Transportation department
3. Five (5) pickup/utility trucks for MOW department
4. One (1), 2-ton heavy duty pickup truck with lift for Storeroom/Materials Management department
5. One (1) utility van for Storeroom/Materials Management department
6. One (1) passenger van equipped with a wheelchair lift and appropriate safety restraint devices.

#### **TP-3.5.5 Initial Provisioning**

Initial Provisioning is a process of determining the range and quantity of items (e.g., spares and repair parts, special tools, test and support equipment, and expendables and consumables) required to support and maintain the subsystems that make-up the Core Systems. The phases of initial provisioning include the identification of items of supply, the establishment of data for catalog, technical manual, and allowance list preparation, and the preparation of instructions to assure delivery of necessary support items with related end articles.

“Spare Parts” and “Spare Equipment” are those items that are rotated into the System to allow worn and failed equipment to be removed and repaired or rebuilt, e.g., electrical motors, compressors, and electronic modules. “Expendables” and “Consumables” are those items that are used or consumed in service and are not repaired, but are replaced with new items, e.g., belts, brake shoes, and collector shoes.

The Core Systems Contractor shall plan, procure, and provide required stocking levels for an inventory of spare parts and equipment, expendables, and consumables to meet all of the System Service Availability requirements of Section TP-3.3, as well as other requirements of the Technical Provisions, necessary to carry out all maintenance in accordance with the Core System Contractor’s Maintenance Plan, and as specified in the Core System Contractor’s Maintenance Manuals, including first overhauls. The Core Systems Contractor shall establish stocking levels, procurement and supply procedures, and meet all related requirements of this section.

HART will obtain required spare tools, parts, equipment, expendables, consumables, and related information from the suppliers of equipment not initially furnished or provided by the Core Systems Contractor but for which the Core Systems Contractor has operating and/or maintenance responsibility, such as the OSB-provided equipment (e.g., the wheel truing machine, in-floor car hoists, etc.). HART will provide these items and information to the Core Systems Contractor for inclusion in the inventory, use in operations and maintenance activities, and inclusion in the MMIS (see Section TP-6).

The following requirements shall apply to the inventory of spare parts, expendables and consumables:

1. A sufficient stock of spare parts and equipment shall be provided to assure that, as worn or malfunctioning equipment is removed from the System, replaced with the spare items, and then

repaired or reconditioned, the System Service Availability requirements are met. The Core Systems Contractor shall determine the specific inventory considering cost, availability, supply process, replacement/procurement lead times and the requirements of the Technical Provisions. In no case shall the inventory be less than that required for operations and maintenance to meet all requirements of the Technical Provisions for less than twenty-four (24) months for a mature System where consumption rates of these materials have reached steady state.

2. All material, spare parts, spare equipment, and special tools needed for the first overhauls of any System equipment shall be identified in the Maintenance Plan and Maintenance Manuals.
3. The inventory shall include sufficient expendables and consumables to operate the System for a 24-month period meeting all operating, service availability, and maintenance requirements of the Technical Provisions.
4. The spare parts and equipment, expendables, and consumables inventory shall be stocked to the above levels at the issuance of each Certificate of Substantial Completion. Any items used during acceptance activities, System Demonstration, and operation and maintenance that occur prior to the issuance of the Certificate of Substantial Completion and that are not used for the purposes of operating and maintaining the System during an O&M Period shall be replaced by the Core Systems Contractor at no additional cost to HART or the City. An insufficiency of spare parts, equipment, expendables, and consumables shall not be an exclusion for any aspect of System Service Availability calculations of Section TP-3.3.

Should it be found during any O&M period that the inventory provided by the Core Systems Contractor is not sufficient to meet the System Service Availability requirements of Section TP-3.3, the required additional inventory shall be provided at no additional cost to HART or the City. A formal review of these levels and processes shall be undertaken jointly by HART and the Core Systems Contractor prior to and as a condition for HART to issue the Certificate of Final Acceptance for the Full System.

5. The Core Systems Contractor shall provide to HART, within 30 days of the issuance of each Certificate of Substantial Completion, a complete list of all inventory items, categorized by subsystem or component, and listing the product or part name, Core System Contractor's part number and supplier's part number, special storage requirements, three (if available) source/manufacturer names and addresses, and current prices. This list shall be arranged by assemblies and subassemblies coordinated with the expanded assembly, pictorials, and assembly instructions of the maintenance manuals. This list shall be part of the computerized MMIS of Section TP-6. Detailed specifications for all such parts and supplies, adequate to provide these items independently of the Core Systems Contractor, shall be provided at no extra charge and within one month after being requested by HART.
6. For a period of not less than twenty (20) years after the issuance of the Certificate of Final Acceptance for the full System, the Core Systems Contractor shall make available to the City renewed, repaired, and replacement parts at fair and reasonable prices based on prices for similar or equivalent items to other customers prevailing at the time of the purchase of said items. Parts shall be interchangeable with the original equipment and be manufactured in accordance with the quality assurance provisions of this Contract. Normal scheduled-delivery orders of spare parts and equipment shall be delivered to the City within a maximum of thirty (30) days of date agreed upon at the time ordered.

The Core Systems Contractor shall provide inventory control, including all activities required to maintain an adequate supply of materials, supplies, parts, and equipment to operate and maintain the System. The Core Systems Contractor shall maintain up-to-date inventory records, which include material, supply, part and equipment listings, required quantities and reorder points. The Core Systems Contractor shall utilize this system to maintain up-to-date records of all maintenance Work and to manage all maintenance activities needed for the maintenance of the System. The Maintenance Plan shall require the Core Systems Contractor to monitor the use of spare parts and consumable items in conjunction with its reliability and maintainability programs, and to maintain an adequate supply of replacements on hand at all times. Whenever an item of spare parts or consumables is used in the performance of services under the Contract, such item shall be repaired or replaced as part of the services under the Contract, and the repaired or replaced item shall be placed in inventory. The Core Systems Contractor shall manage the inventory on a first-in-first-out basis, such that the oldest item in inventory are used first, and shall further provide that no items are retained in inventory that have exceeded their specified shelf life.

Spare parts and consumables shall be kept only at the MSF or other location approved by City. The Core Systems Contractor shall adjust the required inventory of spare parts and consumables, based on the experience gained during the O&M period under the Contract. The Core Systems Contractor shall maintain an inventory of spare parts and consumables at the level specified for initial provisioning and shall, upon completion of the Contract, furnish to the City a complete inventory of spare parts and consumables at the Initial Provisioning level or such revised provisioning level as may be approved by the City. All spares shall have the same configuration or modification status as the comparable items in active service. The security, control, shipping, and disposition of Core Systems Contractor spare parts and consumables shall be the responsibility of the Core Systems Contractor.

### **TP-3.5.6 NOISE AND VIBRATION CONTROL AND MITIGATION**

The Core Systems Contractor shall manage noise and vibration during the performance of operations and maintenance in accordance with the requirements of the contract, operating permits, laws and good practices. The System testing and acceptance procedures and requirements developed by the Core Systems Contractor and accepted by the City in accordance with TP-2 Verification Test and Acceptance (VTA) program shall be used as the baseline for testing and measuring ongoing noise levels through all O&M Periods. The results established through the VTA program and accepted by the City shall be used for determining the acceptance of mitigation efforts when noise and vibration requirements are not met.

### **TP-3.6 CAPITAL ASSET REPLACEMENT; UPDATES AND UPGRADES**

#### **TP-3.6.1 Capital Asset Replacement**

##### **TP-3.6.1.1 Scope**

In addition to performing planned preventive and regular corrective maintenance, the Core Systems Contractor shall provide a Capital Asset Replacement Program (CARP) to periodically overhaul, rehabilitate, refurbish or replace major components, equipment and facilities, in order to ensure that the System remains safe, efficient to operate and maintain, and in good repair. The Core Systems Contractor shall thereby replace any System element that has reached the end of its design life, cannot be maintained to perform within the limits specified in the Technical Provisions, exhibits a measurably

higher failure rate, or ceases to be economical to maintain due to wear-out or obsolescence. All capital asset replacement Work shall conform to the Final Design Documents and the Core Systems Contractor's Capital Asset Replacement Program, unless agreed to by the City in writing. The Capital Asset Replacement Program shall be developed by the Core Systems Contractor and be subject to approval by the City. The Core Systems Contractor shall submit its Capital Asset Replacement Program within one month after being requested by the City. The program shall include but not be limited to a list of all equipment scheduled to be overhauled, rehabilitated, refurbished, or replaced, as well as the schedule and budget for each element of the work during the Full and Optional O&M Periods.

#### **TP-3.6.1.2 Duration**

The Capital Asset Replacement Program shall commence at the start of the Full O&M Period and continue throughout the Full O&M Period and for the Optional O&M Period. Any capital asset replacement work performed during the Intermediate O&M Periods shall be restricted to "last orders" of equipment following notification by the OEM provider that the equipment will no longer be supported or manufactured. All other capital asset replacement work performed during the Intermediate O&M Periods shall be at the Core Systems Contractor's sole expense. The prices for the Capital Asset Replacement Program shall be shown separately from the annual Base Compensation set forth in Exhibit 17, shall be broken down in terms of labor and materials and other costs in Exhibit 17d, and shall be subject to economic price adjustment as defined in SP-6.

#### **TP-3.6.1.3 Schedule**

Commencing in the first year of the Full O&M Period, the City and the Core Systems Contractor shall meet annually (or as mutually agreed) to review the planned capital asset replacement Work and to assess the condition of all assets. On or before October 1 of each year, the Core Systems Contractor shall furnish to the City its recommendation for any capital asset replacement Work to be undertaken in the following calendar year, whether as part of CARP Work or Extra O&M Work. The City shall have the right to defer replacements that it deems not necessary, and that will not adversely affect warranties or System Availability. If the deferral of any CARP Work results in increased costs for operation and maintenance, such costs shall be recoverable by the Core Systems Contractor in accordance with SP-6. If it is evident that capital asset replacements are necessary to meet the requirements of the Contract (for reasons other than events of Force Majeure or changes in the Baseline Service levels) that are not contained in the Core Systems Contractor's Capital Asset Replacement Program, the City shall also have the right to require the replacement of such assets, at the Core Systems Contractor's sole cost and expense, subject to this Section. The Core Systems Contractor's Capital Asset Replacement Program shall not be modified without written acceptance of the City.

#### **TP-3.6.1.4 Authorization to Proceed**

The City shall approve any capital asset replacement prior to the Core Systems Contractor performing the Work, and the City's consent shall not be unreasonably withheld.

#### **TP-3.6.1.5 Cost**

The Core Systems Contractor's Capital Asset Replacement Program Price for each year of the O&M period shall be the budget for that year. At the end of the O&M period, the budget and actual costs for that Period will be reconciled. To the extent that actual replacement costs exceed the budget, the Work shall be performed at the Core Systems Contractor's sole cost and expense (except for costs of replacement due to Force Majeure in excess of insurance proceeds). To the extent that actual

replacement costs are less than the budget (excluding from the budget calculation the amount of budgeted items whose replacement was deferred in accordance with Section 3.6.1.3), the remaining budget amount (the "Excess CARP Amount") shall be paid to the Core Systems Contractor to the extent required to compensate it for the cost of capital asset replacements in excess of the amount budgeted for such Period. Any additional Excess CARP Amount beyond that will be retained by the City.

#### **TP-3.6.1.6 Program Changes**

In the event of any Service Level Adjustment or Extra O&M Work directed by the City that would reasonably be expected to alter the plan for replacement of capital assets, the Core Systems Contractor shall modify the Capital Asset Replacement Program accordingly, in a manner satisfactory to both the City and the Core Systems Contractor, and the Core Systems Contractor's Capital Asset Replacement Program Price shall be adjusted accordingly.

#### **TP-3.6.2 Updates and Upgrades**

##### **TP-3.6.2.1 Enhancements**

From time to time during the Contract Term, the Core Systems Contractor or other parties may develop Enhancements to the Operational Technology and shall provide Enhancements to the City in accordance with Section 3.6.2.2. The Core Systems Contractor agrees to provide all information regarding Enhancements throughout the O&M period, and shall provide Enhancements to the City as required in Section 3.6.2.2. The Core Systems Contractor shall obtain the City's written approval prior to performing any work on Enhancements, such approval to be at the City's sole discretion and shall be provided in writing stating whether such approval will include any compensation in accordance with Section 3.6.2.2.

##### **TP-3.6.2.2 Availability of Enhancements to the City**

The Core Systems Contractor shall offer to the City and shall make available to the City, at the City's election, all Enhancements of Software used in the Operating System that are developed by the Core Systems Contractor, its Affiliates or Subcontractors, at no additional cost.

The supply, installation and implementation of Enhancements of equipment, if approved by the City, shall constitute "Extra O&M Work" and shall be compensated, to the extent approved by the City as set out in 3.6.2.1, in accordance with Section SP-6. Installation and implementation includes installation, testing if required, training and associated modification, upgrade and replacement of equipment and hardware and operational and maintenance changes.

##### **TP-3.6.2.3 Software Installation**

In no event shall the System be considered a test site for new Software or equipment. The Core Systems Contractor may run parallel systems for purposes of testing new equipment and materials, but all Software and equipment must be fully tested and debugged prior to installation on the System.

##### **TP-3.6.2.4 Technology Review Panel**

The parties shall establish a panel to review technological developments at least once per year and determine whether they are required to be provided by the Core Systems Contractor hereunder. Either



party may call for a meeting of the panel at any time. The City and the Core Systems Contractor shall each appoint a three-person team to the panel. Each team shall include at least one financial and one technical representative. Each team shall bear its own expenses. In the event the panel is unable to agree upon required Enhancements, the matter shall be resolved in accordance with the procedures set forth in SP-7.

### **TP-3.6.3 Design and Construction Work**

Unless otherwise agreed in writing by both parties, the Core Systems Contractor shall perform any design or construction Work required under this Contract, including Extra O&M Work, in compliance with the applicable terms and conditions of the Contract, including requirements relating to scheduling, permits and other Governmental Approvals, quality assurance and inspections and testing.

### **TP-3.7 O&M STAFFING**

The Core Systems Contractor shall perform all required operations services, maintenance services, all security monitoring services and O&M administration and management services for the operations and maintenance of the System in accordance with the Contract.

The Core Systems Contractor shall provide all required O&M personnel necessary to perform all operations services, maintenance services, all security monitoring services and O&M administration and management services for the operations and maintenance of the System in accordance with the Contract, and as described herein.

#### **TP-3.7.1 General**

The Core Systems Contractor shall provide a complete staffing plan as part of the Operations and Maintenance Management Plan in accordance with TP-3.2.3.

The Core Systems Contractor shall staff all posts in accordance with the Operations and Maintenance Management Plan. Failure to do so may, at the sole discretion of the City, result in a deduction from the O&M payment to the Core Systems Contractor.

The City reserves the right to require the Core Systems Contractor to provide additional staff, in which case the additional staff shall be subject to the review and approval of the City. The City will make such adjustment to the Contract compensation as may be appropriate in each case pursuant to the Change provisions of the Contract.

The Core Systems Contractor may propose modifications to the staffing plan to the City. Such modifications shall be fully justified and include any changes in staff costs. Upon acceptance of the City, such a modified staffing plan will be included in the new baseline for O&M payments.

Six months prior to the expiration of the term of the Contract, the Core Systems Contractor shall submit an organization chart to the City that reflects the then-current staffing levels. The Core Systems Contractor shall not decrease the staffing level shown in the organization chart within this six month period without the prior written approval of the City.

All employees must report in at the onset of each tour and report out at its completion. Written documentation of the reporting activities must be made available to the City within 24 hours after the close of the business day.

Under special circumstances such as severe weather, security alerts, or special events, the City may direct additional staff hours or positions beyond the hours and positions defined in the staffing plan. If so ordered, the Core Systems Contractor shall fill those positions as directed and the Core Systems Contractor shall be compensated for any additional costs resulting there from in accordance with the Change provisions of the Contract.

Although it is expected that technical specialists outside of Hawai'i will be needed, the City prefers that as many O&M personnel as possible come from the local work force and that the Core Systems Contractor establish an active training program to meet this objective. All O&M personnel shall have the sufficient skill, experience, and current certifications to perform the work assigned to them. Any O&M employee, whether directly employed or subcontracted by the Core Systems Contractor, who is determined by the City to be intemperate, incompetent, a threat to the safety of persons or the System, or who fails or refuses to perform the O&M services or O&M administration and management services work in a manner acceptable to the City, shall be promptly removed by the Core Systems Contractor and shall not be reemployed on the System.

#### **TP-3.7.2 O&M Administration and Management Services Staffing**

O&M administration and management services staffing includes but is not limited to providing all of the functions required to manage the operations and maintenance activities safely and efficiently. The Core Systems Contractor shall provide all required O&M administration and management services personnel to perform such functions, including but not limited to O&M administration and management services personnel for the following:

- A. Supervision: The Core Systems Contractor shall assign qualified and experienced supervisory people, including for the following full-time, on-site O&M key positions:
  - 1. General Manager
  - 2. Train Operations Manager
  - 3. Vehicle Maintenance Manager
  - 4. Maintenance-of-Way Manager
  - 5. System Safety and Security Manager
  - 6. Training and Quality Manager

The minimum level of experience for the General Manager shall be at least five (5) years in an equivalent position. Each other person in an O&M key position shall have at least three (3) years of experience in an equivalent position. The O&M personnel in O&M key positions shall be directly employed by the Core Systems Contractor. The General Manager shall be responsible for overseeing and directing the operations services, maintenance services, and O&M administration and management services of the System.

- B. Clerical support.
- C. Inventory control, including purchasing, disbursement, expediting, receiving, cataloguing, storage, and requisition control in accordance with Sections TP-3.5.5 and MP-2.6.
- D. Preparing and updating reports and records.

- E. Human resources management and administration.
- F. Information technology (IT) administration.
- G. Finance, budget, and payroll.
- H. Operations and maintenance scheduling.
- I. O&M personnel training.
- J. Occupational safety.
- K. Public relations: In accordance with Section MP-2.15.
- L. Security and emergency preparedness: Within this function, the Core Systems Contractor shall assign full-time, on-site O&M security personnel at the MSF site and related facilities 24 hours per day, seven days per week in accordance with Sections MP-2.12, MP-2.13 and MP-2.14. This shall include continuous (24 hours per day, 7 days per week) posting of a security guard at the entrance to the MSF site to:
  - i. verify credentials of individuals attempting to access the site and to
  - ii. authorize/prohibit access by those individuals to the site.
- M. All other required O&M administration and management services personnel as necessary.

### **TP-3.7.3 Operations Services Staffing**

Operations services staffing includes but is not limited to providing all of the functions required to operate the System safely and efficiently in accordance with the Contract and this Section TP-3. The Core Systems Contractor shall provide all required operations services personnel to perform such functions, including but not limited to operations services personnel for the following:

- A. Supervision: The Core Systems Contractor shall assign supervisory people to oversee operations services personnel staffed throughout the System. This may include the provision of supervisory people in stations, on-board trains, and at the MSF site, including in OCC.
- B. System supervision and control: The Core Systems Contractor shall assign qualified people to the OCC continuously (24 hours per day, 7 days per week), in accordance with Section TP-3.2.1. The Core Systems Contractor shall ensure the functions of train dispatching and routing, traction electrification monitoring and control, passenger service and security monitoring, and response to passenger inquiries through this staffing.
- C. Attendants: During all O&M periods and all operational hours of the system, the Core Systems Contractor shall staff driver-certified, roving service attendants continuously in the system. Core Systems Contractor shall also provide service attendants at a level of no less than one service attendant at every station. The Core Systems Contractor shall assign service attendants such that they remain evenly distributed across the mainline to roam among the stations within their assigned zone. The Core Systems Contractor shall retain the flexibility to utilize service attendants within the system as operational needs dictate, including assigning them to stations for increased passenger service presence or to deal with passenger or system related issues, but shall endeavor to maintain the even distribution and use of service attendants as described

above. The continuous coverage requirement herein shall not require the Core Systems Contractor to back-fill posts for service attendants on break.

During all O&M periods and all operational hours of the system, a driver-certified employee shall reach any mainline-stalled train within 15 minutes from the time a train becomes stalled. Failure to reach a train within this timeframe will result in any delay associated with the incident to be assigned to the Core Systems Contractor for the purposes of determining System Service Availability in Section 3.3.

During all O&M periods and all operational hours of the system, a qualified employee shall be able to reach any malfunctioning Platform Screen Gate within 5 minutes from the time the malfunction is discovered.

Service attendant responsibilities shall include participating in the recovery of stalled trains on the mainline, including manually driving trains, resetting Platform Screen Gates and circuit breakers, and performing other procedures on equipment, as directed by the control center or maintenance department. Service attendants shall not troubleshoot equipment anomalies, rather they shall respond according to standard operating procedures or other instructions upon which the attendant has been qualified to undertake. Service attendants shall also assist passengers by answering system-related and other general questions; coordinate the need for security, life-safety, and other system-related responses with the control center, when required; assist with the evacuation of passengers, when required; notify the appropriate staff/organization when cleaning or other repairs are required onboard trains, in stations or at other system-related facilities; assist with the opening and closing of stations; and conduct and report to the control center on visual track/guideway observations made onboard trains and at other system-related facilities.

The Core Systems Contractor shall provide adequate service attendant staffing levels to ensure face to face service within five (5) minutes. This can be accomplished by posts and or roving attendants.

Station attendant responsibilities shall include assisting passengers with the purchase of fare cards, answering fare structure, system-related and other general questions, coordinating the need for security, life/safety, and other system-related responses with the control center, when required; and assisting with the evacuation of passengers, when required. Station attendants shall also be responsible for the opening and closing of stations, coordinating passenger movements during backup bus services and inoperable vertical circulation and platform door equipment, and notifying the appropriate staff/organization when cleaning or other repairs are required at the station. Station attendants shall keep a log of their activities on each shift.

Nothing in these provisions prohibits the cross-utilization of service and station attendants, nor of using common titles for these positions. At no time shall an employee be on duty in the capacity of service and station attendant simultaneously. Unless responding to an incident or emergency, assisting passengers, receiving training, relieving other attendants, or for safety/security purposes, no more than one on-duty service attendant per post shall be permitted, and no more than one on-duty station attendant per post shall be permitted.

In meeting the continuous coverage requirement for station attendants, an on-duty service attendant shall be allowed to fill in for a station attendant on break; however, the 5-minute response time requirement above shall be satisfied at all times.

- D. Train movements at the MSF: The Core Systems Contractor shall assign the appropriate number of qualified drivers to be continuously available (24 hours per day, 7 days per week) at the MSF site to move trains within the MSF site in support of all operations and maintenance activities.
- E. Clerical support.
- F. Preparing and updating reports and records.
- G. Train scheduling.
- H. Operations services employees scheduling.
- I. Passenger services: In accordance with Section TP-3.4.13.
- J. Bus bridge/back-up services: In accordance with Section TP-3.4.9.
- K. All other required operations services personnel as necessary.

#### **TP-3.7.4 Maintenance Services Staffing**

Maintenance services staffing includes but is not limited to providing all of the functions required to maintain the System safely and efficiently in accordance with the Contract and this Section TP-3. The Core Systems Contractor shall provide all required maintenance services personnel to perform such functions, including but not limited to maintenance services personnel for the following:

- A. Supervision: The Core Systems Contractor shall assign supervisory people to oversee maintenance services personnel staffed throughout the System. This may include the provision of supervisory people at various facilities at the MSF, and at other locations within the System.
- B. Maintenance: The Core Systems Contractor shall assign people to maintain the System in accordance with the Contract and Section TP-3.5. The Core Systems Contractor shall assign maintenance services personnel to maintain the following elements of the System:
  1. Vehicles and all on-board equipment
  2. Traction electrification equipment and related facilities
  3. Command, control, and communications equipment and related facilities
  4. Guideway equipment and trackwork
  5. Stations (maintenance of non-public areas housing system equipment and cleaning/janitorial of all other station facility areas) and station equipment, including the Platform Screen Automatic Gate System.
  6. Facilities and equipment at the MSF site
  7. O&M system support vehicles
  8. Pavements and grounds, including cleaning and janitorial services for system kiss/park 'n' ride, parking lots, and related parking facilities

- C. Storeroom support.
- D. Clerical support.
- E. Preparing and updating reports and records.
- F. Maintenance Scheduling.
- G. Maintenance employees scheduling.
- H. All other required maintenance services personnel as necessary.

### **TP-3.8 TRANSFER OF O&M TO CITY AT END OF O&M PERIOD**

#### **TP-3.8.1 Training and Personnel**

##### **TP-3.8.1.1 Training**

Should the City not renew the O&M Work, the Core Systems Contractor shall provide training of City personnel or the personnel of a City-designated organization to operate and maintain the System. The City will give notice of non-renewal in sufficient time for training, which shall be initiated at least twelve months prior to the end of the O&M period. Staff numbers and positions and training procedures will be in accordance with the Core Systems Contractor's staffing plan included in the Operating Plan and Maintenance Plan then in effect.

The Core Systems Contractor shall provide at least four instructors, including one from each of the following disciplines: vehicles, electronics/electrical power, other equipment, and operations. These instructors will prepare the course material, including the latest modifications, equipment changes, maintenance updates, and any revised operating procedures, that may apply to the various areas. Major subcontractors or suppliers may be subcontracted to augment the Core Systems Contractor's own trainers. Literature, training aids, and equipment, including but not limited to the System Simulator, used in training personnel shall be turned over to the City at the termination of the O&M period. The Core Systems Contractor shall design its classroom and on-the-job training with the objective of providing sufficient operations and maintenance personnel competent to operate and maintain the System. The training shall provide at least six months of on-the-job training and classroom training for all operations and maintenance personnel. When the trainees are not attending courses they will assist the existing O&M staff with their operations and maintenance activities to gain "hands on" experience. The training shall be designed with the objective that within six months of the start of the training, but no later than 30 days prior to the end of the O&M period, there shall be a sufficient quantity of trained and certified personnel so the System can be completely run without the Core Systems Contractor's personnel who do not remain with the System.

Nothing shall preclude the City from recruiting or hiring any of the Core Systems Contractor's personnel. Core Systems Contractor personnel who remain in their job and are then employed by the City or its designated third party in that position shall be assumed to be sufficiently trained.

##### **TP-3.8.1.2 Key Personnel Training**

If any individual filling a key personnel position for the City or City-designated organization to operate and maintain the System has not received the training required in Section 3.8.1.1 by the deadline stated therein, the Core Systems Contractor acknowledges the City will suffer significant and substantial damages and that it is impracticable and extremely difficult to ascertain and determine the actual

damages that would accrue to the City in such event. For any such individual, the Core Systems Contractor agrees to pay the City a liquidated damage amount that shall equal two-hundred percent (200%) of the fully burdened salary for six months for a trainer for each subject key personnel position, based on a salary as may be determined by the City. The Core Systems Contractor understands and agrees that any damages payable in accordance with this Section are in the nature of liquidated damages and not a penalty and that such sums are reasonable under the circumstances existing as of the date such training is required. The City shall have the right to deduct any amount owed by the Core Systems Contractor to the City hereunder from any amounts owed by the City to the Core Systems Contractor. The City shall also have the right to seek legal and equitable remedies available to it with respect to the failure of the Core Systems Contractor to provide the required training.

#### **TP-3.8.1.3 Provisional Price of Training**

The Core Systems Contractor's provisional price for training of City-designated personnel shall be based on the requirements described in Section 3.8.1. The provisional price shall be used as the basis of negotiation between the City and the Core Systems Contractor of the actual price for providing such training in the year and under the circumstances prevailing at the time such training is required.

#### **TP-3.8.2 Continued Stocking of Parts and Maintenance of Parts Lists**

One week prior to the termination date of the O&M period, the spare parts, equipment, expendables and consumables inventory shall be fully stocked and complete (including substitution with suitable alternatives for any such spare parts, equipment and expendables that are obsolete or no longer available) to the extent required by the Core Systems Contract and the applicable System operating requirements, as updated by the Core Systems Contractor and accepted by the City. In the event that such inventory is not fully stocked and complete, an amount equal to the cost of restocking and completing such inventory shall be deducted from compensation, if any, due the Core Systems Contractor. To the extent the cost of restocking and completing such inventory incurred by the City exceeds the compensation due the Core Systems Contractor; such differential shall be paid by the Core Systems Contractor to the City within fifteen (15) days after the date of termination of the O&M Work.

At the end of the O&M period, the Core Systems Contractor shall provide the City with a complete parts list and ordering cycle information, which shall be included in the MMIS.

#### **TP-3.8.3 Condition of Assets**

As of the date of termination of the Full O&M Period, all assets shall be in a state of good repair, with a physical and economic life expectancy consistent with the lifetimes indicated in the Core Systems Contract, Guideway Contracts, Station Contracts, and MSF Contract. Any capital asset replaced within one year prior to handover shall have a minimum of a one-year warranty in accordance with GCDB, Chapter 4.26. Any extant warranty for any component of the System shall be transferred to the City.

The Core Systems Contractor shall continue all maintenance cycles until the date of termination. Failure to maintain the assets in a state of good repair shall be cause for termination. Failure to present assets in the appropriate condition at the end of the Full or Optional O&M Period shall constitute grounds for further legal action by City.

**TP-3.8.4 Ongoing Support**

If requested by the City, the Core Systems Contractor will enter into a long-term support agreement following the end of the Term. Such an agreement would include an obligation to provide ongoing parts separate from the provisioning set out in 3.8.2 above and maintenance and service for proprietary software, systems, and equipment. The Core Systems Contractor shall provide the necessary support on commercially reasonable terms (and no worse than the terms offered other entities for similar support) and to negotiate in good faith to finalize the terms of a support agreement memorializing such terms.”

**9. Special Provisions (1-7) Addendum No, 46 Issued February 8, 2011, SP-3.3 Bid Security, Performance and Payment Bonds, Item No. 3.**

“(3) O&M Component – Performance and payment bonds are required for the O&M component of the Contract commencing with Substantial Completion sign-off by the City of the Design-Build component prior to revenue operations of the first operating segment. The O&M performance and payment bonds are to be calculated using Exhibit 17, Schedule of Prices for Operations and Maintenance (SPOM), as amended. For the entire term, the bond amounts shall be calculated based on the sum identified in Exhibit 17 as the “O&M Price” Total for Years 1 through 5, exclusive of the O&M Bond Price (in the chart entitled, “Full O&M Period (First 5-years of the Full Operating Segment)”)(the “Bond Base Amount”). The required bond amounts are as follows:

- a) for Intermediate Periods, ten percent (10%) of the Bond Base Amount;
- b) for the Full O&M Period, fifteen percent (15%) of the Bond Base Amount; and
- c) for the Optional O&M Period (if applicable), fifteen percent (15%) of the Bond Base Amount.

**10. Special Provisions (1-7) Addendum No, 46 Issued February 8, 2011, SP-4.1, Table 4.1 – Schedule Requirements, Item 6-9:**

“

ITEM	SCHEDULE ACTIVITY / MILESTONE	
6	MSF Operational	3/31/2019
7	INTERIM OPENING 1 (E. Kapolei to Aloha Stadium)	12/31/2020
8	INTERIM OPENING 2 (E. Kapolei to Middle Street)	12/31/2022
9	Full Passenger Opening (E. Kapolei to Ala Moana)	12/20/2025

“

**11. Special Provisions (1-7) Addendum No, 46 Issued February 8, 2011, SP-6.18 Monthly Payment, subsections (c) and (d):**

“(c) The Core Systems Contractor’s monthly payment for the Full and Optional O&M Period will consider all of the items in the following list [(1) through (14)], where applicable. The Core Systems Contractor’s monthly payment for the Intermediate O&M Periods will consider all of the items in the following list except adjustment (5).

- (1) The economically-adjusted O&M price for the month of the invoice;



- (2) Service level changes for vehicle miles and operating hours within twenty percent (20%) of the Baseline Service levels;
- (3) The System Service Availability payment factor;
- (4) The cost for Extra O&M Work;
- (5) The economically-adjusted price for CARP Work completed in the month;
- (6) The economically-adjusted price of increased operating hours;
- (7) Accumulated downtime penalty percentages;
- (8) Utility costs for the month of the invoice;
- (9) Insurance price for the month of the invoice;
- (10) Additional Work pursuant to a City-approved Change Order;
- (11) The Cleaning payment factor;
- (12) The MSF Maintenance payment factor; and
- (13) The Readiness Drill payment factor.

(d) Monthly payments for all O&M Periods, shall be calculated using the following formula, as modified according to the inclusion or exclusion of adjustments described for the particular period above:

$$P = \left( (PE_m + (P_{IS_e} \times \Delta_{miles}) + P_{OH_e}) \times F_{A_m} \right) + \Delta W - FF + P_{CE} - (D_p \times PE_m) + PU_m + PI_m - (FC_p \times PE_m) - (FM_p \times PE_m) - (FRD_p \times PE_m)$$

Where:

**P** is the payment for the month;

**PE<sub>m</sub>** is the escalated O&M price for the month of the invoice, as defined by Section 6.25, or by the nature of the already-escalated price (for the Intermediate O&M Period);

**PIS<sub>e</sub>** is the escalated value of incremental service in dollars per vehicle mile;

**Δ<sub>miles</sub>** is the number of incremental vehicle miles, if any, operated below or above the baseline vehicle miles based on the applicable Baseline Service levels for such month to be set forth by the Core Systems Contractor in accordance with Tables 7, 8 and 9 of Section 3.4.6. This variable is negative if the increment is below the baseline and positive if the increment is above the baseline;

**POH<sub>e</sub>** is the escalated value of increased operating hours, as defined in Section 6.19;

**FA<sub>m</sub>** is the Availability Payment Factor, as defined in Section 6.20;

**ΔW** is the price for Extra O&M Work, as defined in Section 6.24;

**FF** is the total deduction for loss of fare vending system availability;

**PCE** is the escalated price for Capital Asset Replacement Program Work completed in the month, as defined in Section 6.25;

**D<sub>p</sub>** is the accumulated downtime penalty percentages in accordance with Table 8;

**PU<sub>m</sub>** is the utility cost for the month of invoice, as defined in Section 6.18, and is included only if the City elects to pay for those costs as a pass-through via the Core Systems Contractor;

**PI<sub>m</sub>** is the insurance price for the month of invoice; and

**FC<sub>p</sub>** is the Cleaning payment factor, as defined in Section 6.22.

**FM<sub>p</sub>** is the MSF maintenance payment factor, as defined in Section 6.22.

**FRD<sub>p</sub>** is the Readiness Drill payment factor, as defined in Section 6.22.”

**11. Special Provisions (1-7) Addendum No. 46 Issued February 8, 2011, SP-6.20 System Availability Requirements, subsections (c) - Paragraph 1, and subsections (g) and (h):**

“ c) Failure Analysis and Correction Report. If in any calendar month of the Intermediate, Full, or Optional O&M Periods any of the following events occur:

(1) System Service Availability, A, of ninety-nine and one-half percent (99.5%) is not at least met, or performance records indicate it will not be met; or

2) System Downtime Events exceed the limits specified in Section TP-3.3.6.2.”

“g) Damages to the City. If the Core Systems Contractor fails to meet the relevant level of System Service Availability, the performance requirements relating to MSF Facilities Maintenance, the City will incur substantial losses and damages that are incapable of accurate measurement. Such losses and damages include loss of use, enjoyment, and benefit of the System by the general public, injury to the City's credibility and reputation with the general public who depend on and expect high levels of operation and maintenance services, of which injury to credibility and reputation may directly result in loss of ridership and reduced revenues, and additional costs of administering this Contract (including engineering, legal, accounting, overhead, and other administrative costs). These damages are incapable of accurate measurement because of, among other things, the unique nature of the System and the unavailability of a substitute for the System. The parties have agreed to these liquidated damages in order to fix and limit the Core System Contractor costs and to avoid later disputes over which items are properly chargeable to the Core system Contractor.

h) Sole Monetary Remedy. The reductions in compensation set forth in Section 6.20 resulting from the Contractor's operation of the System at less than 99.5 percent System Service Availability (or less than 97.0 percent System Service Availability during the Shuttle Service O&M Period) and in Section 6.22 for failure to maintain the MSF and related facilities in accordance with the requirements therein, are intended to be the sole monetary remedy for the circumstances therein described. It is understood and agreed by the Core Systems Contractor that any adjustments to compensation imposed in accordance with Sections 6.20, 6.21 or 6.22 are in the nature of liquidated damages and not a penalty and that such sums are reasonable under the circumstances existing as of the date of execution and delivery of this Contract.”

**12. Special Provisions (1-7) Addendum No. 46 Issued February 8, 2011, SP-6.25 Economic Price Adjustments (a)(1)(A), (a)(1)(B), (b) and (f):**

**a. SP-6.25 Economic Price Adjustments (a)(1)(A) and (a)(1)(B):**

“(A) All labor prices shall be quoted in the Core Systems Contractor's price proposal on forms provided in Exhibit 17 to these Special Provisions. These prices shall be increased by 16.85% to reflect an agreed average inflation rate of 2.25% per annum from the Base Month until November 2018 (the “**Labor Base Month**”) and thereafter adjusted by a factor that shall be defined as the ratio of (i) the latest CPI-Urban Wage Earners and Clerical Works All items in Urban Hawaii for Honolulu, Hawai‘i (Series ID: CWURS49FSA0) (“labor index”), not seasonally adjusted) published by the U.S. Bureau of Labor Statistics that is available one month before the beginning of each year of the Full O&M Period to (ii) the same index for the Labor Base Month.”

(B) All material prices shall be quoted in the Core Systems Contractor's price proposal on forms provided in Exhibit 17 to these Special Provisions. These prices shall be adjusted by a factor that shall be defined as the ratio of: (i) a composite index, consisting of the simple average of a) the Line-Haul Railroads Product Index (Series ID: PCU482111482111) and b) the Railroad rolling stock mfg-Street, subway, trolley, and rapid transit cars and railway maintenance equipment and parts index (Series ID: PCU3365103365105) Producer Price Indices (PPI) published by the U.S. Bureau of Labor Statistics

that are available one month before the beginning of each year of the Full O&M period to ii) the same composite index for the Base Month.”

**b. SP-6.25 Economic Price Adjustments (b):**

“(b) For the Full O&M Period the escalated monthly price shall be calculated according to the following equation:

$PE_m$	=	$PL_m$	X	1.1685	X	$\frac{LAB_m}{LAB_{base}}$	+	$PM_m$	X	$\frac{PPI_m}{PPI_{base}}$
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Where:

- $PE_m$  is the escalated O&M price for the month of invoice;
- $PL_m$  is the lump sum labor price for the month of invoice;
- 1.1685 is the agreed labor inflation adjustment between the Base Month and the Labor Base Month;
- $LAB_{base}$  is the labor index for the Labor Base Month;
- $LAB_m$  is the labor index for the month of invoice;
- $PM_m$  is the lump sum material price for the month of invoice;
- $PPI_m$  is Composite PCU 482111482111 and PCU3365103365105 for the month of invoice;
- $PPI_{base}$  is Composite PCU 482111482111 and PCU 3365103365105 for the Base Month; and
- $m$  is the month to which the O&M Price is being escalated.

- (1) Base Month. The base month for escalation purposes shall be the month of Contract execution.
- (2) Labor and Materials Lump Sum Prices. The lump sum prices for labor (PLm) and materials (PMm) shall be 1/12th of the annual amounts as set forth in Exhibit 17 of the Special Provisions of this Contract.
- (3) Building Service Maintenance Labor Adjustment. Annual labor adjustments to reflect changes in the state prevailing wage rates for workers performing labor classified as building service maintenance work and identified in the Core Systems Contractor’s Proposal, shall be negotiated by the Core Systems Contractor and the City as a change order in accordance

with Section 6.24.”

c. **SP-6.25 Economic Price Adjustments (f):**

“(f) Capital Asset Replacement Price Adjustments:

(1) Calculation of Labor and Material Price Adjustment. In each monthly invoice for actual capital asset replacement expenditure, the Core Systems Contractor shall separately identify the actual material and labor costs expended for Capital Asset Replacement Program Work and also a calculation of the equivalent portion of labor and materials from the Capital Asset Replacement Program Price based upon an Economic Price Adjustment according to the following equation:

$$P_{CD} = PCL_m \div 1.1685 \div \frac{LAB_m}{LAB_{base}} + PCM_m \div \frac{PPI_m}{PPI_{base}}$$

Where:

$P_{CD}$  is the de-escalated cost for Capital Asset Replacement Program Work completed in the month, as defined in this Section;

$PCL_m$  is the actual cost of the labor component of the Capital Asset Replacement Program Work completed for the month of invoice;

1.1685 is the agreed labor inflation adjustment between the Base Month and the Labor Base Month;

$LAB_{base}$  is the labor index for the Labor Base Month;

$LAB_m$  is the labor index for the month of invoice;

$PCM_m$  is the actual cost of the materials component of the Capital Asset Replacement Program Work completed for the month of invoice;

$PPI_m$  is Composite PCU 482111482111 and PCU 3365103365105 for month m;

$PPI_{base}$  is Composite PCU 48211482111 and PCU 3365103365105 for the Base Month; and

$m$  is the month to which the Capital Asset Price is being escalated.

The values of  $P_{CD}$  calculated above, and as agreed by the City, shall be utilized to determine the maximum amounts of invoices that shall be paid pursuant to sections SP-6.23 and TP-3.6.1.5.

**Example Calculation of Capital Asset Replacement Price Adjustment**

Assumptions:

Actual invoice cost for CARP Labor in Year 2 of Full O&M for month m = \$3,750,000  
Actual invoice cost for CARP Materials in Year 2 of Full O&M for month m = \$1,875,000  
Total invoice cost for CARP in Year 2 of Full O&M for month m = \$5,625,000  
Price of CARP Work (PC) Exhibit 17 (Year 2 of Full O&M) = [REDACTED]  
Lab<sub>base</sub> = 100  
LAB<sub>m</sub> = 110  
PPL<sub>m</sub> = 250  
PPL<sub>base</sub> = 200

**Convert actual invoiced costs to equivalent CARP Price in Base Month (PC<sub>base</sub>)**

$$\begin{aligned} PC_{base} &= 3,750,000 \div 1.1685 \div (110 / 100) + (1,875,000 \div (250 / 200)) \\ &= \$2,917,493 + \$1,500,000 \\ &= \$4,417,493 \end{aligned}$$

The amount remaining in the CARP Price budget for Year 2 of Full O&M is therefore revised to \$ [REDACTED] - \$4,417,493 = \$ [REDACTED] in Base Month dollars."

**13. Management Provisions dated March 2010, MP-2.1 Introduction, Paragraph 1:**

"The Core Systems Contractor shall provide all required personnel, supplies, and materials necessary to perform, and shall perform the management and administration of the operations and maintenance of the System. The City will provide, through third party contract or self performance maintenance and repair of the guideway structure, stations, and parking facilities. The City will provide landscaping maintenance (except within the MSF and TPSS areas), fare vending and revenue collection services, System Level 2 security as set out in MP 2.14, except at the MSF and at rooms/buildings housing System equipment (e.g., TPSSs), where the Core Systems Contractor will provide all security for the site and related facilities. The Core Systems Contractor shall coordinate and manage the interfaces with the City-operating, maintenance, Level 2 security staff, police, utilities and other first responder functions."

**14. Management Provisions dated March 2010, MP-2.6 Inventory Control, Paragraph 1:**

"The Core Systems Contractor shall provide all aspects of inventory control and all activities required to maintain an adequate supply of materials, supplies, and equipment to operate and maintain the System. This shall include such functions as purchasing and disbursement, expediting, receiving, cataloguing, storage, and requisition control. The Core Systems Contractor shall maintain computerized inventory records in the MMIS that include equipment, parts, supplies, materials, and consumables listings, sources, prices, required quantities, and reorder points. The Core Systems Contractor's MMIS shall be compatible with the City's Asset Management System."

**15. Management Provisions dated March 2010, MP-2.8 O&M Contract Performance (D):**

"D. Lost Articles – The Core Systems Contractor shall be responsible for ensuring that all articles found by its employees are turned in to the City's agent in charge of such articles at the City's Lost and Found Center."

**16. Management Provisions dated March 2010, MP-2.11 Upgrades and Expansion Work (B), subsections 1, 2, and 3:**

1. Enhancements – From time to time during the Work, the Core Systems Contractor or other parties may develop enhancements to the Operating System that are desirable but not necessary for the ongoing Operations and Maintenance of the System. The Core Systems Contractor agrees to provide all information regarding such enhancements throughout the O&M Period, and shall provide such enhancements to the City at its request. The Core Systems Contractor shall obtain the City’s written approval prior to performing any work on enhancements, such approval to be at the City’s sole discretion and shall be provided in writing stating whether such approval will include any compensation in accordance with paragraph 2.
2. The supply, installation and implementation of enhancements of equipment, if approved by the City, shall constitute “Extra Work” and shall be compensated, to the extent approved by the City as set out in paragraph 1, in accordance with the Contract, as described in Sections SP-5.3 and SP-6.24. Installation and implementation includes; installation; testing as required; training; associated modification, upgrade and replacement of equipment and hardware; and operational and maintenance changes.
3. Software Enhancements – The Core Systems Contractor shall offer to the City and shall make available to the City, at the City’s election, all enhancements of software used in the Core Systems that are developed by the Core Systems Contractor, its affiliates or subcontractors, at no additional cost.”

**17. Management Provisions dated March 2010, MP-2.14 Security Administrative Activities:**

**“MP-2.14 SECURITY ADMINISTRATIVE ACTIVITIES**

The Core Systems Contractor shall accomplish the following security-related administrative activities and functions for internal staff and contractors working within the System:

- A. Training. Maintain high standards of competency, conduct, and integrity of all security personnel by:
  - 1. Ensure all security personnel are fully trained prior to being assigned to security duty.
  - 2. Provide continued training and professional development of all security personnel.
  - 3. Ensure that all training program development, presentation and administration is accomplished and/or maintained in accordance with all applicable O&M SOW requirements.
  - 4. Ensure Level 2 security staffing provided by the City and Honolulu Police are trained on System related matters.
  
- B. System Badges and Passes. Be responsible for the design, preparation, issue, use and control of a pass and badge system for the System. The Core Systems Contractor shall:
  - 1. Process and control all visits and tours.
  - 2. Track all new Core Systems Contractor hires and terminations to ensure passes and badges are appropriately controlled.
  - 3. Maintain and update the access control system database, particularly as contractor, Level 2 security and employee's access requirements change due to hires, terminations, or retirements.
  - 4. Inquiries. Conduct preliminary inquiries concerning reported incidents involving misconduct on the part of the Core Systems Contractor's employees and the theft or loss of City property.
  - 5. Barriers and Key/Lock Control. Coordinate the purchase, installation, and repair of physical barriers (doors, fences, gates, alarms, automated access control systems, etc.), security signs/notices and security-lock hardware/keys, and maintain security lock/key control records for the System.
  - 6. Human Resources. Maintain all personnel records required by the City and required by law.
  - 7. Vehicles. Provide all necessary security vehicles, including their routine maintenance, repairs, fuel, and licensing.”

**18. Management Provisions dated March 2010, MP-2.15.2 Advertising on the System:**

**“MP-2.15.2 Advertising on the System**

The City reserves the right to place advertising in or on any of the System facilities and cars. The Core Systems Contractor shall facilitate and clean all advertising media, which will not interfere with the Core Systems Contractor's O&M Work or other aspects of the System. The Core Systems Contractor shall facilitate and not impede any advertising program conducted by the City for the System. The City will receive all advertising revenues.

The Core Systems Contractor shall not conduct advertising in or on any of the vehicles, stations, guideways or facilities of the System without the express consent of the City.”

**19. Management Provisions dated March 2010, MP-2.15.3 User Guides and Maps:**

**“MP-2.15.3 User Guides and Maps**

The Core Systems Contractor shall stock and replenish system maps and user guides provided by the City in holders provided in the vehicles for that purpose. The Core System Contractor will stock and replenish system maps and user guides provided by the City in holders provided in the stations. The City will provide transit system related artwork to be used by the Core System Contractor for producing fixed transit system maps for Trains.“

**20. Management Provisions dated March 2010, MP-2.17 Limits of and Access to the O&M Work Area Paragraph 3, subsection (H):**

“H. Backup OCC and the Joint Traffic Management Center (JTMC): O&M personnel shall be provided access to the Backup OCC and the JTMC for training, maintenance, and use when the primary OCC at the OSB is unavailable. Access shall include parking areas, restrooms, lunchrooms, and other support rooms/spaces for controllers, as required.”

**21. Management Provisions dated March 2010, MP-2.7 Management Reports and Records, Paragraph 4, Item C.**

“C. Operating statistics, including but not limited to:

1. All system service availability date;
2. Schedule of services: headways, capacities and hours of peak, off-peak, and night operations; and
3. Vehicle-miles and vehicle-hours operated.”