TP-1: Core Systems Description
Honolulu High-Capacity Transit Corridor Project

October 2010

Prepared for:
City and County of Honolulu

TABLE OF CONTENTS

TP-1 CORE SYSTEMS DESCRIPTION

TP-1.1 PROJECT OVERVIEW

The City and County of Honolulu (City) has undertaken the Honolulu High-Capacity Transit Corridor Project (HHCTCP or Project) to reduce congestion in the ‘Ewa-to-Downtown corridor. Currently, residents experience one of the worst peak period commutes in the nation, and the number of daily trips is estimated to be 27 percent higher by 2030.

An alternatives Analysis of potential approaches to address the traffic congestion problem was completed in 2006, with the fixed-guideway alternative selected. There was a subsequent technology assessment, which concluded that conventional modern rail transit was the optimum application for the fixed-guideway project. The City identified a Locally-Preferred Alternative alignment for the fixed-guideway system, which included a First Project and a full build-out.

The First Project is a 20-mile mostly elevated rail line that will connect West O‘ahu with downtown Honolulu and Ala Moana Center. The Locally-Preferred Alternative covered in the Draft Environmental Impact Statement includes extensions which, along with the First Project, comprise a 34-mile rail system.

The Draft Environmental Impact Statement (EIS) was released for public review in October 2008, and the comment period concluded in February 2009. The Final EIS was released in June 2010, and the City anticipates a Record of Decision in 2010. Groundbreaking will follow shortly thereafter.

The initial 20 miles of the Honolulu Rail Transit System (System) will be constructed in segments, with incremental openings per the schedule in SP-4.1.

Patronage is estimated at about 8,100 passengers per hour per direction in the year 2030. The System shall be designed to accommodate the ultimate growth to at least 12,150 passengers per hour per direction. Refer to TP-3 for determining the number of revenue vehicles required for this Work.

TP-1.2 IMMEDIATE WORK BY OTHERS

The Core Systems Contractor shall coordinate and manage the Systems interfaces with other HHCTCP contracts in order to effectively perform the DBOM Work. Refer to MP-1, “Systems Interface Management & Coordination”. Initially this interface requirement will require early coordination with the following contracts. Please refer to SP-4.1 for all schedule information.

TP-1.2.1 West O‘ahu/Farrington Highway Guideway

The West O‘ahu/Farrington Highway Guideway DB Contract (WOFH) will be the first contract let for the Project. WOFH is a design-build contract covering the first 7-miles of the Project’s guideway from East Kapolei to Leeward Community College.

WOFH includes:

A) Relocate utilities;

B) Design and build concrete guideway structure;

C) Design and build elevated and at-grade trackway;

D) Design and build emergency walkway;

E) Design and build duct bank for Core Systems cabling along at-grade trackway;

F) Prepare sites for traction power substations and gap breaker station, including ground mat, concrete pad, man holes and duct banks to the base of guideway columns;

G) Install track, special trackwork, switch machines and contact rail;

H) Construct mounting provisions for systemwide raceway and Core Systems apparatus within soffit, and construct knock-outs for Core Systems cabling penetration to the surface; and

I) Construct mounting provisions for guideway emergency lighting.

TP-1.2.2 Maintenance & Storage Facility

The Maintenance & Storage Facility (MSF) is located off Farrington Highway between Waipahu High School and Leeward Community College consisting of several buildings along with storage tracks and the Operations and Servicing Building that houses the Operations Control Center (OCC). This contract is a design-build contract.

The scope of work for the MSF contract includes the following:

A) Clear and grade the MSF site;

B) Design and build major structures, storage yard, yard lead and circulation tracks, parking lots, and roadways, including:

1) Operations & Servicing (O&S) Building;

2) Maintenance-of-Way (MOW) Building;

3) Train Wash Facility;

4) Wheel Truing Facility;

5) Extensive Interior Cleaning Track;

6) Sanding Facility;

7) MOW Rail Vehicle Track;

8) Gated Main Access with Guard Booth;

9) Gated Secondary Access; and

10) Pedestrian and Roadway Gates within the MSF.

C) Design and furnish passenger vehicle maintenance shop equipment;

D) Design and furnish mechanical, electrical and plumbing systems throughout the MSF;

E) Prepare sites for traction power substation and train control house;

F) Design and install duct banks for Core Systems cabling throughout the MSF;

G) Furnish track, special trackwork and switch machines for the MSF and the entire First Project alignment; and

H) Furnish contact rail and appurtenances for the MSF and the entire First Project alignment

TP-1.2.3 Farrington Highway Stations

Three Stations are located between West Loch and Leeward Community College (inclusive) that require at-grade work and elevated work on the Guideway. The Stations will use a Design-Bid-Build delivery method that will require the Core Systems Contractor to coordinate initially with the Final Design Consultant and continue coordination with the Construction Contractor.

TP-1.2.4 West Oahu Stations

Three stations - East Kapolei, UH West O‘ahu, and Ho‘opili - are located in the western segment of the Project. The stations will use a Design-Bid-Build delivery method that will require the Core Systems Contractor to coordinate initially with the Final Design Consultant and continue coordination with the Construction Contractor.

TP-1.3 SUBSEQUENT WORK BY OTHERS

The schedule of HHCTCP contracts making up the 20-mile System is shown in Figure TP-1-1. Each of the subsequent contracts requires close coordination by the Core Systems Contractor.

TP-1.3.1 Stations

Stations will be constructed in groups, under design-bid-build contracts. The Core Systems Contractor shall coordinate with the final designer and the construction contractor for each of these contracts.

TP-1.3.2 Guideway Segments

Subsequent guideway segments will be constructed under design-build, or design-bid-build contracts; they will include site preparation for traction power substations and gap breaker stations and installation of track, special trackwork, switch machines and contact rail The Core Systems Contractor shall coordinate with the final designer and the construction contractor for each of these contracts to ensure that physical, functional, and scheduling interfaces are properly affected.

TP-1.3.3 Utilities Relocations

Subsequent utilities relocations will be contracted separately from the guideway construction contracts. The Core Systems Contractor shall support the City as required in its coordination with the contractor for each of these contracts.

TP-1.3.4 Elevators and Escalators

The City will have HHCTCP elevators and escalators furnished under a systemwide contract. The Core Systems Contractor shall coordinate with the final designer and the contractor for this contract to ensure that physical, functional, and scheduling interfaces are properly affected and that warranties are conveyed to the Core Systems Contractor.

TP-1.4 CORE SYSTEMS CONTRACT OVERVIEW

The Core Systems Contractor shall design, furnish, install, test and commission passenger vehicles, operating systems, auxiliary vehicles and equipment, and appurtenances, in support of incremental opening of the System. The Core Systems Contractor shall operate the System in passenger service for a period of time. The Core Systems Contractor shall maintain passenger vehicles, operating systems furnished under the Contract and other related equipment and systems, including equipment and systems furnished by others, on the main line, in the stations, and in the MSF, for the same period of time.

TP-1.4.1 Passenger Vehicles

The Core Systems Contractor shall design, manufacture, test and commission the passenger vehicles.
In concert with the driverless concept for the System, the passenger vehicles will not be equipped with an operator’s cab. The vehicles will be configured as end-units and middle-units, with each of the end-units furnished with a normally-concealed hostler panel to permit manual train movement in the MSF, as well as on the main line under extraordinary circumstances. To permit easy movement between vehicles, they will have open, wide gangways. Trains will run off a nominal 750-V dc electrification system, with a contact rail. Maximum operating speed for the passenger vehicle shall be 65 mph to accommodate future operational options.

Passenger vehicles will be of the high-floor type. Station platforms will be 240 ft long, designed to accommodate up to a 4-vehicle consist of nominally 60-ft-by-10-ft units.

Vehicles shall comply with the Americans with Disabilities Act in all respects, including platform horizontal and vertical gap, onboard wheelchair accommodations, audible and visual passenger information system, and accessible emergency communications.

.

Acoustical noise associated with train movements is an important consideration for O‘ahu, and the vehicle design shall address noise abatement.

TP-1.4.2 Train Control System

The Core Systems Contractor shall design, manufacture, test and commission the automatic train control system for main line and MSF ready/layover tracks and the yard train control system, including the Yard Control Tower (YCT).

The train control system shall support main line operations at 90 seconds between terminals, with maximum operating speed of 55 mph. End-of-line terminals shall be designed to accommodate the ultimate capacity of the System. Stations will have equipment rooms with space for wayside train control apparatus. OCC controllers shall have the capability to monitor and control train movements on the main line and on MSF ready/layover tracks, but vitality shall reside in field equipment.

Within the MSF, train movements on storage, circulation, and shop lead tracks shall be manually operated, with speed limited to 10 mph by the train control system. The YCT shall manage train movements throughout the storage tracks, shop leads, and circulation tracks, setting switches and directing hostlers via radio.

Switch machines on the main line and in the MSF will be furnished and installed by Fixed Facility Contractors, but shall be controlled by the train control system.

TP-1.4.3 Traction Electrification System

The Core Systems Contractor shall design, manufacture, install, test and commission traction power substations (TPSSs) and gap breaker stations (GBSs), as well as traction power feeder and return cabling, in support of incremental opening of the System.

TPSSs and GBSs shall be in prefabricated structures, placed on concrete pads prepared by either the guideway contractors or the MSF Contractor.

The traction electrification system shall provide power for train operations at a nominal 750 V dc, with contact rail distribution.

Hawaiian Electric Company will furnish medium voltage at either 11.5 kV or 12.47 kV, depending on location, and will have a metering cubicle in every substation structure.

The traction electrification system shall support full-service train operations with any single TPSS out of service and the two adjacent substations in operation.

Site preparation for TPSSs and GBSs will be by civil contractors, but the Core Systems Contractor shall furnish and install all cabling, including exposed conduit and pull boxes on the guideway structure.

The Core Systems Contractor shall design, manufacture, install, test and commission blue light stations, as well as motorized disconnect switches in the MSF.

TP-1.4.4 Communications and Control Systems

The Core Systems Contractor shall:

A) Procure, install, test and commission City-compatible voice radio communication system apparatus;

B) Design, manufacture, install, test and commission:

1) The Operations Control Center (OCC) workstations and displays;

2) The Backup OCC workstations and displays;

3) The SCADA system;

4) The stations passenger information system and train passenger information system;

5) The stations CCTV system, the train CCTV system and the MSF CCTV system;

6) The MSF public address system;

7) The backbone data communication system; and

8) The wireless data communication systems.

C) The telephone systems:

1) Emergency;

2) Train Emergency; and

3) Passenger Assistance.

D) Administrative:

1) The maintenance management information system; and

2) The systemwide master clock system.

The primary OCC shall be situated on the third floor of the O&S Building at the MSF. The backup OCC shall be installed at a downtown City facility.

TP-1.4.5 Fare Vending System

The Contractor shall design, manufacture, install, test and commission the fare vending system in support of incremental opening of the System.

The City intends to utilize a proof-of-payment fare policy on the rail transit system. Fare media and fare vending will be compatible with the City's existing public transportation system.

The ticket vending machines shall accept bills and coins and shall dispense a time-stamped ticket that will serve as proof of payment on the train and a valid transfer to other modes.

If the City decides that parking lots or the parking structure will require payment, the same fare vending equipment will be used.

The ticket vending machines shall be designed to allow for future addition of modules to accept credit and debit cards or smart cards, when and if the existing public transportation system begins accepting such

payment media.

TP-1.4.6 Intrusion Detection System

Intrusion detection with alarm shall be provided at locations and devices where general public access is prohibited or where public access requires emergency response. These include:

A) Entry gates at TPSS and GBS sites;

B) Non-public spaces and rooms at stations;

C) Trackway areas within stations, beyond platform edges;

D) End-of-platform gates and emergency exit gates at stations;

E) Access panels for automated electric defibrillators; and

F) Access panels for blue light stations.

TP-1.4.7 Access Control System

An access control system shall ensure that only authorized persons enter certain System areas and facilities.

These include enclosures at TPSSs and GBSs; the pedestrian entrance at the main MSF gate; and the internal gate to access the MSF secondary access roadway.

Within the MSF, the visitors' gate shall be access-controlled to ensure that only escorted visitors enter employee-only areas. Access to the storeroom shall be limited to authorized persons, as shall access to the OCC and YCT.

TP-1.4.8 Auxiliary Rail and Highway Vehicles

The Core Systems Contractor shall furnish all rail and highway vehicles needed to support System operation and maintenance.

TP-1.4.9 Accommodation for Passenger Vehicle Delivery to the Project Site

The Project's MSF site will be designed to accommodate lowboy truck/trailers entering the Maintenance Storage Facility (MSF) area via the Secondary Emergency Access Road located at the North West corner of the MSF site for the delivery of passenger vehicles, if needed. The Secondary Emergency Access Road crosses the eastbound and westbound mainline ballasted tracks at grade. The grade crossing is in a curve(s) (Curves No. CC13 between Sta. 701+14 and Sta. 711+00).

To accommodate Passenger Vehicle delivery, Curves No. CC13 will temporarily be constructed with a maximum superelevation of 1 inch, which will impose a maximum speed of 30 mph through the curves.

After the Passenger Vehicle delivery phase is completed, the Core Systems Contractor shall adjust Curves No. CC13 to the final design configuration with a maximum superelevation of 3 inches, increasing the maximum speed to 50 mph through Curves No. CC13.

TP 1.4.10 Guideway

Guideway will be provided under separate contracts. All Core Systems equipment shall be designed to accommodate guideways without plinths. Preliminary design information for guideway sections without plinths can be found in the attached drawing packages:

1. WOFH 100802 Raceway Definitive Design Submittal
2. WOFH 100825 Direct Fixation Track PIDR EvB Drawings

3. WOFH 100910 Guideway Superstructure WA12347 PID Drawings Rev B

This design information is preliminary and subject to refinement.

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 and YCT 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, fare inspection staff, custodial staff, and landscaping staff will be provided by the City, except for security staff provided and managed by the Core Systems Contractor for the MSF site and rooms/buildings that house system equipment. The City will be responsible for revenue collection.

TP-1.5.1 Operating Segments

Refer to SP-4.1 for the Schedule of System openings for all O&M Periods and TP-3 for operations and maintenance requirements.

TP-1.5.2 Maintenance

Maintenance of the System commences with the first turnover to the Core Systems Contractor of a fixed facility, subsystem, or system that has successfully gone through Verification Testing and Acceptance and received from the City a Certificate of Substantial Completion. Protocols for the transition from Design-Build to operating segments are described in TP-2 “Verification Testing and Acceptance”.

Further requirements can be found in both the Management Provisions (MP-1 through MP-10) and the balance of the Technical Provisions (TP-2 through TP-8). Any conflicts found in these provisions should be brought to the attention of the City for clarification.

TP 1.6 PLATFORM EDGE BARRIERS WALL

In the future, the City plans to procure and install platform edge barrier walls, platform doors and all associated equipment for the HHCTCP. The Core System Contractor's work associated with these system elements is described in this TP Section 8 Part 34 44 00 Part 2 Sec. 2.11 Automatic Platform Doors, TP 1.6 Platform Edge Barriers Wall, Design Criteria Section 14.5.2, and Design Criteria Section 14.4.8. As part of this Contract, the Core System Contractor shall provide the ATC equipment, software, design and construction interfaces, and all appurtenances required to operate all platform edge barrier walls and platform doors that are required for the ultimate station length to accommodate the maximum train length.

The City intends to have the Core System Contractor procure the hardware for platform barrier wall and station doors with integral alarms activation devices with City’s input. The Core System Contractor shall, as such time as may be reasonably determined by the City, solicits at least three (3) bids from qualified Subcontractor to perform such work on a fixed price basis. The Core System Contractor shall submit to the City prior written approval, a written analysis of the bids, in reasonable detail, together with the Core System Contractor’s recommendation to award. Upon City’s written approval of a Subcontractor and the applicable contract to be entered into by and between Supplier and such Subcontractor, which approval may be withheld, conditioned or denied in its sole and absolute discretion, (i) the Core System Contractor shall be authorized to award such work to the approved Subcontractor and (ii) the City and the Core System Contractor shall execute a Change Order in accordance with Section SP Chapter 5. However, should the

City decide to conduct the procurement and perform installation of the platform edge barrier walls and platform doors by itself in the future, the Core System Contractor's scope of work for these system elements shall remain in accordance with the requirements described herein.