

ANNEX 2: TECHNICAL SPECIFICATIONS

Project Title: **Sustainable Energy Development Project (SEDeP)**
Source of Funding
(loan/credit
/grant no.): **D261-MH**
Contract Name: **Supply and Installation of Charging Stations and Central Management System for EV pilot project at Majuro, Republic of Marshall Islands**
Contract Ref: **MH-MEC-160488-GO-RFQ**
Contract Name: **Supply of Electrical vehicles for pilot project in Majuro, Republic of Marshall Islands**
Contract Ref: **MH-MEC-123334-GO-RFQ (Re-invited) (RFQ-R)**

2. TECHNICAL SPECIFICATIONS

2.1 – EV charging stations:

Scope of Work:

The Works and Services to be delivered within the Scope of Work consists of, but are not limited to, the Materials and the Civil Works necessary for the EV charging stations.

The Works and the Services consist of, but are not limited to, those listed below:

- (1) Materials
 - A) EV charging stations,
 - B) Electrical system, and
 - C) Others as specified in the other parts hereof.
- (2) Civil Works
 - A) Foundations for EV charging stations,
 - B) Transformer foundations, (if needed), and
 - C) Others as specified in the other parts hereof.
- (3) Design Services for the Materials
 - A) Supply of all required Supplier's Documents.
- (4) Design Services for the Civil Works
 - A) Design services for the Civil Works listed above,
 - B) Supply of all required Supplier's Documents.
- (5) Supply, Installation and Testing Services
 - A) Supply, installation and testing of the Materials listed above.
- (6) Supply, Construction and Testing Services of the Civil Works
 - A) Supply, construction and testing of the Civil Works listed above.
- (7) Training Services for the Purchaser
 - A) Training during the installation and commissioning on the site

Specifications:

This Technical Specification describes the definition, requirements and specifications for low voltage AC electric vehicle (EV) charging stations in Majuro, RMI. It also specifies the requirements for digital communications between the AC EV charging station and electric vehicle for control of AC charging. The civil works and the electrical works associated with construction of the AC EV charging station is within the scope of the Supplier.

A. General Requirements

No.	Parameter	Description
1	EVSE type	Dual port AC EVSE with 6-10 kW/port
2	Energy transfer mode	Conductive
3	Charging mode	Slow or semi-quick EV connection to the AC power supply using a specific

		device.
4	Reliability and Serviceability	Charger shall be Compact Pillar charger with an option for wall mounting.

B. System Structure

No.	Parameter	Description
1	Regulation	IEC 61851-1:2017, IEC 61851-21-2 Or UL2594,UL2231-1/-2
2	Isolation	Each output isolated from each other with proper insulation
3	Environmental conditions	Outdoor use in Pacific Islands, including considerations for king tides
4	Power supply	EV charging station connected to AC mains
5	Charge control communication	Communicate by digital and analog signals
6	Interface Inter-operability	Interoperable with any EV (non-dedicated, can be used by any consumer).

C. Input Requirements

No.	Parameter	Description
1	AC supply system	Three-phase four-wire (3 ϕ -4 wire) 208V/120V
2	Nominal Input Voltage	208V \pm 10% *
3	Rated Capacity	Less than 25 kVA per charger (2 sets of charger per station)
4	Rated frequency	60 Hz \pm 3%

* If the proposed EVSE needs different input voltage (i.e. 240V Single-phase), the Supplier shall set and quote for the transformer in the installation cost.

D. Output Requirements

No.	Parameter	Description
1	Output Power	6-10 kW/port
2	Output Current	To be set the maximum output current Current ripple should be less than 5%
3	Converter Efficiency	0.9 or higher
4	Power factor	0.9 or higher (at full load)
5	Charger Connector Types	SAE J1772, Type 1 Plug/Socket
6	Number of Outputs	2

E. Functional Requirements

No.	Parameter	Description
1	Charging cable length	Up to 7m*
2	Cable Type	Charging cable and connector permanently attached to charger *
3	Card Reader	To be decided with authentication system
4	Locking system	Lock & Keys for mainboard and lockable connector

*The Supplier shall set and quote for the cable management system, considering the design of the parking lots and construction plan at the three installation sites.

F. Environmental Requirements

No.	Parameter	Description
1	Ambient Temperature Range	0° to 50°C*
2	Storage Temperature	0° to 60°C*
3	Ambient Humidity	95% RH Max*

*The Supplier shall set and quote for the range, considering the climate condition in Majuro (Annual average temperature; 28°C with the maximum daily variation about 7°C, Annual average rainfalls; 3,500 mm).

G. Mechanical Requirements

No.	Parameter	Description
1	Enclosure Rating	Ingress Protection (IP) 55 or NEMA 4 *
2	Mechanical Impact	Shall not be damaged by mechanical impact as defined in section 11.11.2 of IEC 61851-1, Section 39 of UL2594
3	Mechanical Stability	Shall not be damaged by mechanical impact as defined in section 11.11.3 of IEC 61851-1, Section 41 of UL2594
4	Dimension(W*H*D)	To be decided with the construction plan, considering parking lots.

*The Supplier shall set and quote for the canopy, considering the climate condition in Majuro (Coastal area). The Supplier shall consider the salt-tolerant enclosure.

H. User Interface and Display Requirements

No.	Parameter	Description
1	ON-OFF(start-stop) switches	Mandatory
2	Emergency Stop switch	Visible and easily accessible
3	Visual indicators	Error indication, presence on Input supply indication, state of charge process indication
4	Display	LCD screen, user interface with touch screen or keypad
5	Support Language	English
6	Display Message	EVSE should display appropriate messages for user including not limited to; Vehicle plugged in/Vehicle plugged out User authorization status Duration since start of charge: kWh and time Idle/Charging in process: State of Charge (SOC) % Fault conditions Metering Information: Consumption Units
7	Authentication	As per Open charge point protocol (OCPP), but the Supplier shall propose options such as mobile application, RFID card, or Password system. Charging starts only after user authentication is

		successful.
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I. Communication Requirements

No.	Parameter	Description
1	Communication interface between charger and central management system (CMS)	Ethernet with Bluetooth, WiFi or Cellular network (2G/3G/4G) *
2	Communication between EVSE and CMS	Open charge point protocol (OCPP) 1.5/1.6 protocol or higher

*The Supplier shall discuss with local tele communication service provider in RMI (i.e. National Telecommunication Authority) and propose the most appropriate communication system.

J. Billing and Payment Requirements

No.	Parameter	Description
1	Billing	Grid responsive metering
2	Payment	As per OPCC, but the Supplier shall propose options as mobile application payment, Membership system supported by credit card, debit card and other type of pre/ post-paid systems.
3	Setting for Pricing	Can be set of Time-of-day rates and Time span rates (including but not limited to)

K. Safety

No.	Parameter	Description
1	Safety Parameters	EVSE complies with relevant safety standards/ regulations such as IEC listed, UL listed, EMC or ETL listed.

L. Energy Measurement and Management

No.	Parameter	Description
1	Measurement and recording	Measure and record the input/output power
2	Power measurement accuracy	IEC62053-21 Class 2 level or higher
3	Energy management	Load shed by percentage of running average or to fixed power output

M. Installation and Commissioning:

The scope of installation work will include a detailed survey of the locations (One at MEC Office, second at NEO Office and third in the parking lot of Airport) and all work pertaining to wiring infrastructure prior to distribution board in cooperation with MEC and supply and installation of all items including civil, mechanical and electrical works on need basis depending on site conditions.

For the purposes of this request, the “Supplier” refers to the respondent to the request; and may consist of an original equipment manufacturer of electric vehicle supply equipment (EVSE), a vendor packaging EVSE equipment and software from other companies, or a local construction/installation company working collaborating or sub-contracting with charging equipment and software companies.

All electric and civil work including the related supplies (i.e cables, distribution board, transformer, circuit breakers (including but not limited to) etc.) required for Installation and commissioning shall be under the Supplier’s scope. (See the attached drawings of EV-01 and EV-01)

Commissioning of Charger System at three locations ((One at MEC Office, second at NEO Office and third in the parking lot of Airport)shall be in the scope of the Supplier. Final Acceptance shall be based on successful completion of the same. Any replacement of failed/damaged items during commissioning shall be exclusively at the Supplier’s cost. The Supplier is advised to stock necessary spares and ensure easy availability to facilitate trouble free commissioning. The Supplier is expected to work with project managers from

communication/system integrator/ utilities for resolving the following risks (non-exhaustive indicative list):
poor equipment performance, project scope creep, unavailability of internal and external sources,
Rectification of equipment faults.

O. Specific Requirements:

- a. **Input voltage:** If the proposed EVSE needs different input voltage (i.e. 240V Single-phase), the Supplier shall set and quote for the transformer in the installation cost.
- b. **Cable management:** The Supplier shall set and quote for the cable management system, considering the parking lots and construction plan at installation three sites.
- c. **Pacific Islands/ Coastal environment:** The Supplier shall set and quote for the canopy and other environmental parameters, considering the climate condition in Majuro (Coastal area, Annual average temperature; 28°C with the maximum daily variation about 7°C, Annual average rainfalls; 3,500 mm). Construction plan will be developed considering the trend of Climate Change (e.g. sea level rise, king tide, etc.) in this area.
- d. **Safety compliance:** The Supplier shall submit the copies of certificate or relevant test reports to show safety functions of EVSE. Safety Parameters are including but not limited to over current, under voltage, over voltage, residual current, surge protection, short circuit, earth fault at input and output, input phase reversal, emergency shutdown with alarm, over temperature, protection against electric shock.
- e. **Open charge point protocol (OCPP)/ EVSE management service:** The Supplier shall discuss with tele communication service provider in RMI (i.e. National Telecommunication Authority) and propose the most appropriate communication system.

The charging equipment shall be compliant with the protocols including OCPP. The Supplier shall provide a consolidated application or software to operate charging equipment. (The creation of application or software is not in the scope of this Tender.)

The Table below summarizes the minimum specifications for the EVSE management service:

Category	Minimum Specifications
General	
Basic Software Design	<ul style="list-style-type: none"> Cloud server system Control and manage necessary information/ data by using website with dashboards Facilitate use by EV drivers using a mobile application
User information management	<ul style="list-style-type: none"> User account information will be input through the app or website and registered in cloud server
Mobile application for the EV drivers	
Registration	<ul style="list-style-type: none"> Create user account by the app
Booking for Charging	<ul style="list-style-type: none"> Display the charging spot on the map Reserve the charging spot by the app Automatic wait- listing and email notifications to of next driver
Changing Operation	<ul style="list-style-type: none"> Remotely start a charging session after user authentication by the app Remotely stop a charging session or disable a charger
Notification	<ul style="list-style-type: none"> E-mail and text notifications to drivers when charging complete
Payment	<ul style="list-style-type: none"> Support payment through the app with banking information or credit card Record the payment history
Service for station owner	
Monitoring	<ul style="list-style-type: none"> View charging station status by the station owner's dashboard Remotely start and stop a charging session or disable a charger Automatic email notifications to maintenance/repair including communication system failure
Price setting	<ul style="list-style-type: none"> Set the following rates and update anytime with web portal <ul style="list-style-type: none"> ➢ Charge different usage rates for different users ➢ Charge Time-of-day rates (price per kWh) (e.g peak time/ off-peak

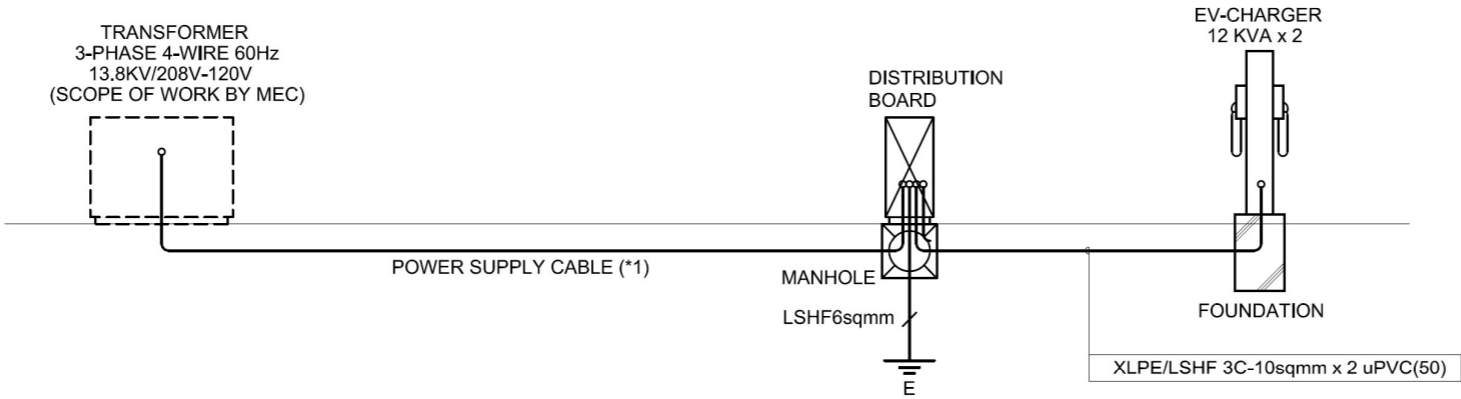
	time rates, weekday/weekend rates) <ul style="list-style-type: none"> ➤ Charge Time span rates (e.g. costs increase after a certain time period to increase station turnover)
Reporting/ data analysis	<ul style="list-style-type: none"> • View and download usage reports including but not limited to; <ul style="list-style-type: none"> ➤ Status of the number of EV drivers, ➤ Time and charged energy (kWh) of EVs, ➤ Frequency of usage of each charging spots ➤ Revenue by rates, time
Security of cloud server	
Security items	<ul style="list-style-type: none"> • Provide necessary countermeasures of server security including; <ul style="list-style-type: none"> ➤ Physical measures for information security ➤ Data backup ➤ Measures to protect the hardware (e.g. server, data storage, network facilities, etc) ➤ Vulnerability assessment and countermeasures ➤ Prevention of unauthorized access ➤ Management of the access log ➤ Encryption of the communication system

f. **Training/documentation:** The Supplier shall provide the minimum training for operation and maintenance of EVSE with User Manuals, FAQ, OEM Functional Manuals and Installation Guides, and Troubleshooting Guides. (Both hard copy and soft copy).

g. **Warranties:** The charging equipment should include a minimum of 3 years warranties for factory parts

2-3 Electrical System

Electrical System consists of, but not limited to, the facilities specified in the attached drawings of EV-01 and EV-02 on the following pages.

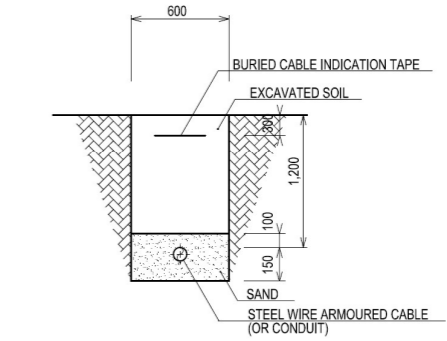


SCHEMATIC DIAGRAM

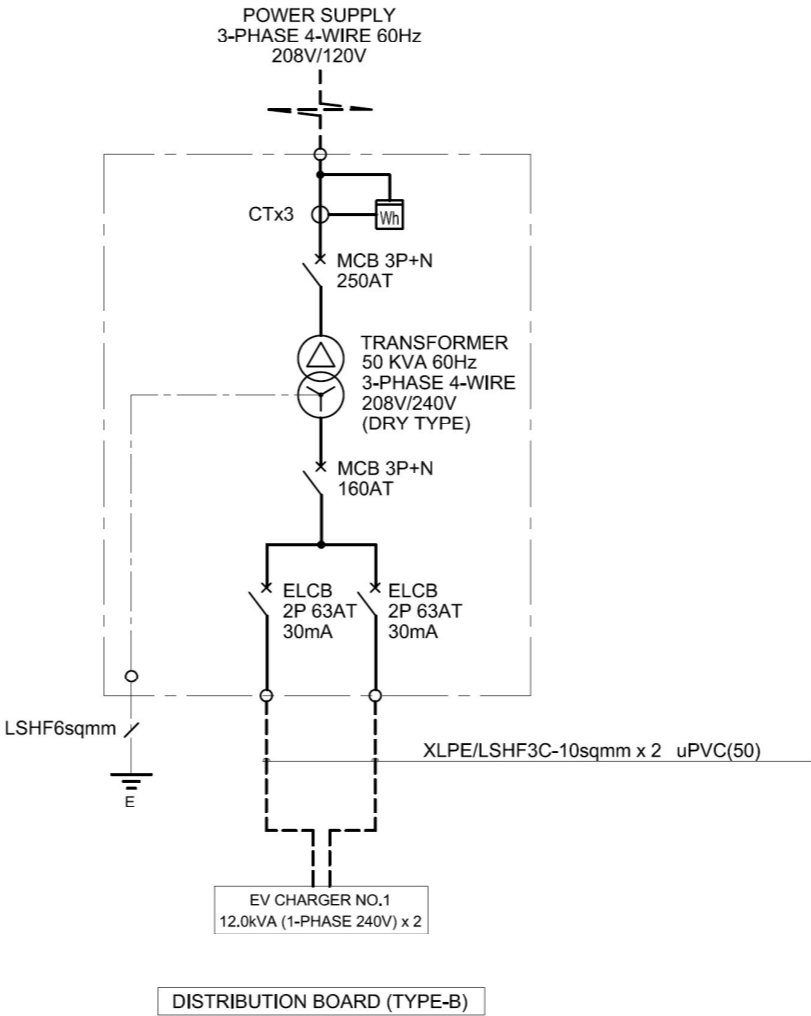
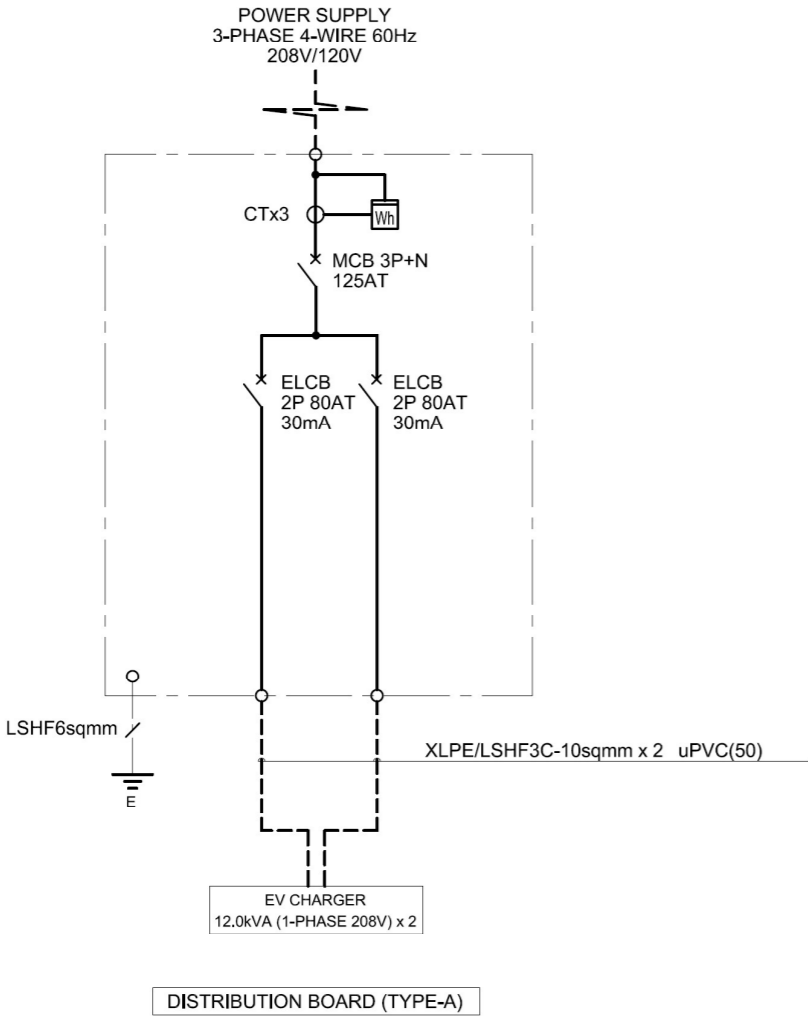
QUANTITIES LIST OF MATERIAL / EQUIPMENT

ITEM	SPECIFICATION	UNIT	QUANTITY			NOTE
			MEC	NEO	AIRPORT	
WIRE	LSHF 6sqmm	m	5.0	5.0	5.0	
CABLE	XLPE/LSHF 3C-10sqmm	m	20.0	20.0	20.0	
CABLE	SWA/XLPE/LSHF 4C - 35sqmm	m	—	40.0	50.0	POWER SUPPLY CABLE (*1)
CABLE	SWA/XLPE/LSHF 4C - 70sqmm	m	75.0	—	—	POWER SUPPLY CABLE (*1)
CONDUIT	uPVC(50)	m	10.0	10.0	10.0	
DISTRIBUTION BOARD	TYPE-A or TYPE-B	SET	1.0	1.0	1.0	
EV CHARGER		SET	1.0	1.0	1.0	
MANHOLE	0.9m(W)x0.9m(D)x1.35m(H) W/COVER	SET	1.0	1.0	1.0	
GROUNDING ELECTRODE		SET	1.0	1.0	1.0	LESS THAN 5 OHM
CONCRETE FOUNDATION	0.6m(W)x0.60m(D)x0.75m(H)	SET	1.0	1.0	1.0	FOR EV CHARGER
BURIED CABLE INDICATION TAPE		m	85.0	50.0	60.0	
EXCAVATION	0.6m(W)x1.35m(D)	m3	68.85	40.5	48.6	
BACK FILL	SAND	m3	12.75	7.5	9.0	
BACK FILL	EXCAVATED SOIL	m3	56.1	33.0	39.6	

*SWA: STEEL WIRE ARMoured CABLE



DEPTH OF UNDERGROUND CONDUIT



- ABBREVIATION -

ABBR.	MEAN
Wh	WATT-HOUR METER
CT	CURRENT TRANSFORMER
MCB	MINIATURE CIRCUIT BREAKER
ELCB	EARTH LEAKAGE CIRCUIT BREAKER
E	GROUNDING

- NOTE-
DISTRIBUTION BOARD SPECIFICATION
- 1. MATERIAL OF ENCLOSURE:
HOT DIP GALVANIZED STEEL STRUCTURE OR
STAINLESS STEEL STRUCTURE WITH THICKNESS
1.6mm OR MORE
 - 2. INGRESS PROTECTION CODE: IP55 OR NEMA4
 - 3. TYPE: SELF-STANDING TYPE

Category	Minimum Specifications	KONA EV
General		
Model year	2019	2020
Body style	SUV/Crossover/Hatchback	SUV
Number of seats	5	5
Number of doors	4	4
Passenger Capacity	5	5
Trunk Cargo Space	11.72 ft3 (0.33 m3)	0.544 m3
Curb Weight (Maximum)	3,854 lbs(1,748 kg)	1,743 kg (heaviest)
Battery and Range		
Battery Capacity	60 kWh	64 kWh
Voltage	327 V	356 V
Driving range (EPA)	200 mi (321 km)	449 km
Vehicle Performance		
Electric Motor	100 kW	150 kW
Horse Power	134.1 hp (136.0 ps)	204 ps
Torque	20Nm (32.6 kgm,236.0 ft/lb)	395Nm (290.4 ft/lbs)
Acceleration:0 to 60mph (0 to100kph)	9.5 seconds (9.8 seconds)	(0 to 100kph) 7.6 seconds
Top speed	89.5mph (144 kph)	167 kph
Vehicle Charging		
Onboard Charger	Type 2 : 6-10 kW	7.2 kW
DCFC Capabilities	Up to 100kW	Up to 100kW



