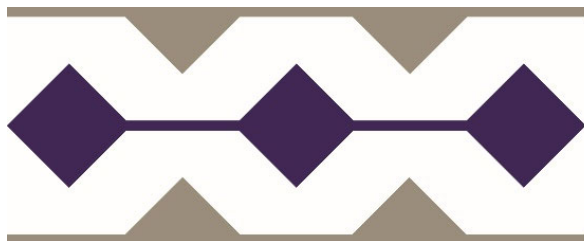


REQUEST FOR PROPOSALS
FOR
FIRM RENEWABLE DISPATCHABLE GENERATION
ISLAND OF MAUI

APRIL 27, 2023

Docket No. 2017-0352

*Appendix H – Interconnection Facilities Cost
and Schedule Information*



**Maui
Electric**

TABLE OF CONTENTS

Section 1 – Cost Responsibilities..... 1

 1.1 – Definitions..... 1

 1.2 – Abbreviations 1

 1.3 – Facilities At Proposer Site 2

 1.4 – Proposer Facility Service Power and Company Switching Station Power..... 2

 1.5 – Remote Substation Facilities..... 3

 1.6 – Interconnection to Specific Company Sites 4

 1.7 – Line Extension from Grid Connection Point (GCP) To Proposer Site..... 4

 1.8 – T&D System Upgrades 4

 1.9 – Company-Owned Fiber..... 5

 1.10 – Telecommunication Facilities 5

 1.11 – Control System Acceptance Test (CSAT) 6

 1.12 – Proposer Payments..... 6

Section 2 – Interconnection Requirements and Costs..... 7

 2.1 – Substation & Meter Baseline Costs 7

 A. Not Used 7

 B. Not Used 7

 C. Typical Transmission Interconnection..... 7

 2.2 – Interconnection to Specific Company Sites..... 8

 A. Lahainaluna Substation..... 8

 B. Kealahou Substation 9

 C. Waena Switchyard – FIRM GENERATION ONLY..... 9

 2.3 – T&D Baseline and Line Extension Costs 10

 A. Not Used 10

 B. Not Used 10

 C. Typical Transmission Interconnection Baseline..... 10

 D. Line Extensions and Upgrades..... 11

 69kV..... 11

 E. Service Power 12

 2.4 – Project Management Baseline Costs..... 13

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

A. Not Used	13
B. Not Used	13
C. Transmission Projects	13
2.5 – Typical Telecommunications Requirements and Costs	13
A. Not Used	13
B. Variable Projects ≥ 1 MW and ≤ 3 MW	13
C. Variable Projects > 3 MW	14
D. Firm Projects	14
E. Projects Interconnecting to a Company Switching Station.....	14
F. Telecommunications Baseline Costs	15
Communications Cabinet or Enclosure	15
Lease Line Options	15
Fiber-Optic Cable Option	15
Microwave Option	16
Projects Interconnecting to a Company Switching Station Only.....	16
2.6 – Typical Security Requirements and Costs	17
A. Proposer Responsibilities at Proposer Facility	17
B. Proposer Responsibilities for New Company-Owned Substations.....	17
Section 3 – Proposer-Build Responsibilities.....	19
3.1 – COIF at Proposer Site	19
3.2 – COIF at Existing Company-Owned Substations	19
3.3 – T&D Line Work.....	19
3.4 – Telecommunications	20
3.5 – Security	21
Section 4 – Typical Company Durations for Interconnection Projects	21
4.1 – Not Used	21
4.2 – Not Used	21
4.3 – Transmission Projects	21
4.4 – Additional Durations to Interconnect at an Existing Substation.....	22

To assist Proposers in estimating costs of potential projects, the information provided in this document can be used to approximate the cost for Company-Owned Interconnection Facilities (COIF), including substation, telecommunications, security, transmission and distribution lines, and project management.

Tariff Rule No. 19, approved by the PUC, establishes provisions for Interconnection and Transmission Upgrades (<https://www.hawaiianelectric.com/billing-and-payment/rates-and-regulations/>). The tariff provisions are intended to simplify the rules regarding who pays for, installs, owns, and operates interconnection facilities in the context of competitive bidding. Tariff Rule No. 19 and applicable RFP requirements will be utilized as the basis for addressing interconnection and transmission upgrades for any projects developed. Proposers will comply with the terms and conditions as specified therein.

SECTION 1 – COST RESPONSIBILITIES

The purpose of Section 1 is to clearly define the cost responsibilities of construction, replacements, and upgrades of Company-Owned Interconnection Facilities (COIF) and existing Company-owned facilities in compliance with Tariff Rule No. 19.

1.1 – DEFINITIONS

1. **Betterment** – Any upgrading to a facility made solely for the benefit of and at the election of the Company and is not required by applicable laws, codes, Company Standards, and the interconnection requirements in accordance with Tariff Rule No. 19.
2. **Company** – Hawaiian Electric, Maui Electric, or Hawai‘i Electric Light.
3. **Company-Owned Interconnection Facilities** – The equipment and devices owned by Company that are required to permit a generating facility to operate in parallel with and deliver electric energy to Company’s system and provide reliable and safe operation of, and power quality on, Company’s system.
4. **Grid Connection Point** – The point that the new interconnection facilities associated with the Proposer’s project interconnects to the Company’s existing electrical grid.
5. **Interconnection Agreement** – The executed contract between the Company and Proposer (e.g., Power Purchase Agreement, Standard Interconnection Agreement, etc.).
6. **Point of Interconnection** – The point of delivery of energy supplied by Proposer to Company, where the Facility owned by the Proposer interconnects with the facilities owned or to be owned by the Company.
7. **Proposer** – The developer proposing a renewable project in response to a Company RFP.

1.2 – ABBREVIATIONS

1. **ADSS** – All Dielectric Self-Supporting
2. **COIF** – Company-Owned Interconnection Facilities
3. **CT** – Current Transformer
4. **DFR** – Digital Fault Recorder

5. DTT – Direct Transfer Trip
6. FS – Facility Study
7. GCP – Grid Connection Point
8. HVAC – Heating, Ventilation, and Air Conditioning
9. IRS – Interconnection Requirements Study (includes both SIS and FS)
10. NDA – Non-Disclosure Agreement
11. OPGW- Optical Ground Wire
12. POI – Point of Interconnection
13. PT – Potential Transformer
14. RTU – Remote Terminal Unit
15. SCADA – Supervisory Control and Data Acquisition
16. SIS – System Impact Study
17. UFLS – Under-Frequency Load Shed

1.3 – FACILITIES AT PROPOSER SITE

1. Proposer shall be responsible for all costs related to COIF at the Proposer site required by any relevant Rule or Tariff, Request for Proposal, and/or the IRS. This may include, but is not limited to:
 - a. Project management, design, permitting/regulatory fees and approvals, land rights, installation labor, inspection, construction management, and testing
 - b. Site work (grading, trenching, manholes/handholes, conduits, cable trench, concrete pads/foundations, fencing, roadways/driveways, ground grid, lighting, etc.)
 - c. Substation structures, design, and configuration (i.e., breaker and a half, ring bus, etc.)
 - d. Control equipment enclosure/cabinet
 - e. Equipment (circuit breakers, transformers, relays, switches, arresters, batteries, HVAC, RTU, DFR, DTT, meters, PTs, CTs, etc.)
 - f. Telecommunication equipment (See Telecommunication Facilities section below)
 - g. Electrical work (bussing, wiring, lightning protection, fiber optic cable, etc.)
 - h. Security systems/equipment
2. Company shall be responsible for Betterment costs.

1.4 – PROPOSER FACILITY SERVICE POWER AND COMPANY SWITCHING STATION POWER

1. For all distribution-level service power, Proposer shall submit an Electrical Service Request Form via www.hawaiianelectric.com. Please refer to the [Large Customer New Service Request brochure](#) for milestones and estimated timeline.
2. Proposer shall be responsible for all costs related to providing service power to the Proposer's facility. Facility service power is NOT a part of COIF, but Proposers should account for it in the total costs to build the project.
3. Station power is required if a new Company switching station or substation is built to allow the interconnection of the Proposer's project. If station power is required, the

Hawaiian Electric Company
Company-Owned Interconnection Facilities Cost and Schedule Information

- Proposer shall be responsible for all costs related to the primary and backup station power sources. This may include, but is not limited to:
- a. Project management, design, permitting/regulatory fees and approvals, land rights, installation labor, inspection, construction management, and testing
 - b. Overhead electrical facilities (poles, conductor, insulators, crossarms, guy wires, transformers, etc.)
 - c. Underground electrical facilities (cables, splices, termination, grounding, transformers, switchgears, etc.)
 - d. Step-down transformer
 - e. Civil/structural work (survey, grading, trenching, conduits, manholes/handholes, concrete pads, concrete pier foundations, pole hole excavation, etc.)
 - f. Vegetation trimming and traffic control
4. Options for primary station power sources for the Company's various switching station voltages are:
- a. Tap off the bus through a step-down transformer for 23kV through 69kV
 - b. 12kV line extension and service transformer for 23kV through 138kV
 - c. Gensets are not an allowable substitute for the above options
5. Proposer shall be responsible for obtaining all permitting and land rights.

1.5 – REMOTE SUBSTATION FACILITIES

1. Proposer shall be responsible for all costs for work at remote substations caused by the interconnection of Proposer's project. This may include, but is not limited to:
 - a. Project management, design, permitting/regulatory fees and approvals, land rights, installation labor, inspection, construction management, and testing
 - b. Site work (grading, trenching, manholes/handholes, conduits, cable trench, concrete pads/foundations, fencing, roadways/driveways, ground grid, lighting, etc.)
 - c. Substation structures
 - d. New control equipment cabinet or existing enclosure expansion
 - e. Equipment (circuit breakers, transformers, relays, switches, arresters, batteries, HVAC, DFR, DTT, meters, PTs, CTs, etc.)
 - f. Electrical work (bussing, wiring, lightning protection, fiber optic cable, etc.)
 - g. Telecommunications equipment
 - h. Company has completed a high-level analysis to determine anticipated remote substation requirements prior to the RFP. Proposer may ask Company for a list of those requirements based on Proposer's indicated interconnection point after Proposer has signed a Non-Disclosure Agreement (NDA). Such requirements will be confirmed in the Interconnection Requirements Study.
2. Company shall be responsible for the following costs:
 - a. Betterment
 - b. Changes to the Under-Frequency Load Shed (UFLS) scheme

1.6 – INTERCONNECTION TO SPECIFIC COMPANY SITES

1. Proposer shall be responsible for all costs related to COIF required at the Company's site by any relevant Rule or Tariff, Request for Proposal, and/or the IRS. This may include, but is not limited to:
 - a. Project management, design, permitting/regulatory fees and approvals, land rights, installation labor, inspection, construction management, and testing
 - b. Site work (grading, trenching, manholes/handholes, conduits, cable trench, concrete pads/foundations, fencing, roadways/driveways, ground grid, lighting, etc.)
 - c. Substation structures, design, and configuration (i.e., breaker and a half, ring bus, etc.)
 - d. Control equipment enclosure/cabinet
 - e. Equipment (circuit breakers, transformers, relays, switches, arresters, batteries, HVAC, RTU, DFR, DTT, meters, PTs, CTs, etc.)
 - f. Telecommunication equipment (See Telecommunication Facilities section below)
 - g. Electrical work (bussing, wiring, lightning protection, fiber optic cable, etc.)
 - h. Security systems/equipment
2. Company shall be responsible for Betterment costs.

1.7 – LINE EXTENSION FROM GRID CONNECTION POINT (GCP) TO PROPOSER SITE

1. Proposer shall be responsible for all costs related to the line extension between the GCP and the Proposer site. This may include, but is not limited to:
 - a. Project management, design, permitting/regulatory fees and approvals, land rights, installation labor, inspection, construction management, and testing
 - b. Overhead electrical facilities (poles, conductor, insulators, crossarms, guy wires, etc.)
 - c. Underground electrical facilities (cables, splices, terminations, grounding, transformers, switchgears, etc.)
 - d. Civil/structural work (survey, grading, trenching, conduits, manholes/handholes, concrete pads, concrete pier foundations, pole hole excavation, etc.)
 - e. Company fiber (ADSS fiber, OPGW shieldwire, splice boxes, etc.)
 - f. Vegetation trimming and traffic control
2. The Company shall be responsible for the following costs:
 - a. Betterment

1.8 – T&D SYSTEM UPGRADES

1. Proposer shall be responsible for all costs related to system upgrades or changes required to accommodate the Proposer's project (e.g., re-conductoring or recircuiting of existing lines that do not have the required ampacity, re-fusing or re-programming of protective devices upstream of the GCP, etc.).

1.9 – COMPANY-OWNED FIBER

1. If Company-owned fiber is used to satisfy the communications requirements in the IRS, then the Proposer shall be responsible for all costs related to routing the ADSS fiber or OPGW from the nearest existing splice point to the Proposer site. This may include, but is not limited to:
 - a. Project management, design, permitting/regulatory fees and approvals, land rights, installation labor, inspection, construction management, and testing
 - b. Company fiber-optic cable (ADSS fiber cable or OPGW shieldwire) and associated equipment/hardware (splice boxes, innerduct, vibration dampers, etc.)
 - c. Splicing and Testing of fiber strands
 - d. Pole replacements and additional equipment if needed for additional capacity
 - e. Civil/structural work (survey, grading, trenching, conduits, manholes/handholes, concrete pads, concrete pier foundations, pole hole excavation, etc.)
 - f. Vegetation trimming and traffic control
2. Company will provide the location(s) of the nearest fiber splice point(s) after the Proposer has signed a Non-Disclosure Agreement (NDA).
3. Company shall be responsible for Betterment costs.

1.10 – TELECOMMUNICATION FACILITIES

1. Telecommunication Cabinet
 - a. If a control equipment enclosure will not be built, the Proposer shall be responsible for all costs related to installing a telecommunication cabinet required to accommodate the telecommunication equipment at the Proposer's facility. This may include, but is not limited to equipment racks and ancillary infrastructure, 48V DC Power System (includes 48V DC Charger w/ at least 12-hr battery backup), alarming, and air conditioning.
2. Telecommunication Power
 - a. Proposer shall be responsible for all costs related to providing reliable 48V DC power to Company equipment at a new Company switching station or a Proposer-owned station. This may include, but is not limited to battery racks, banks, fuse panels, and associated power system equipment.
3. Fiber Termination Equipment
 - a. If Company-owned fiber is used to satisfy the communication requirements in the IRS, then the Proposer shall be responsible for all costs related to terminating the ADSS fiber or OPGW at the new Company switching station and point of interconnection to Company's existing system. This may include, but is not limited to a fiber termination panel and associated equipment/hardware (fiber guide, splice trays, connectors, etc.).
4. Microwave Radio or Wireless Radio
 - a. If Company-owned microwave radio (6GHz, 10/11 GHz, etc.) or Company-owned wireless radio (900MHz, 450MHz, etc.) is used to satisfy the communications requirements in the IRS, then the Proposer shall be

responsible for all costs related to installing the microwave or wireless radio/link at the new Company switching station and remote site(s). This may include, but is not limited to:

- i. Pre-design requirements (path survey/engineering, FCC frequency coordination, licensing, filings, EME study if required, etc.)
 - ii. Project management, design, permitting, regulatory fees and approvals, land rights, labor, inspection, construction management, and testing
 - iii. Pole or tower facilities to support the microwave dish and its connection to the microwave equipment (waveguide, cables, conduit, etc.)
 - iv. Civil/structural work (survey, grading, trenching, conduits, manholes/handholes, concrete pads, concrete pier foundations, pole hole excavation, etc.)
 - v. Antenna system design and installation
5. Leased Service
- a. If 3rd party leased service will provide telecommunication connectivity to the new Company switching station, then the Proposer shall be responsible for all costs related to ordering and installing the leased service at the site. This may include, but not be limited to the initial cost to establish the leased line(s) required for the project, monthly recurring leased cost of the service(s), and on-going maintenance of the service(s).
6. Telecommunication Service Equipment
- a. Telecommunication equipment is required to provide circuits to support the various applications at the new Company switching station. The Proposer shall be responsible for all costs related to installing the telecommunication equipment. This may include, but is not limited to:
 - i. Project management, design, installation, and testing
 - ii. Telecommunication routers, multiplexors, and associated equipment/hardware

1.11 – CONTROL SYSTEM ACCEPTANCE TEST (CSAT)

1. Proposer shall be responsible for all costs related to the CSAT, including all Company costs in support of the Proposer's CSAT.

1.12 – PROPOSER PAYMENTS

1. The Company shall require upfront payment prior to the commencement of any phase of work based on an estimate of Company costs for that phase. A true-up at the end of the project shall be completed and a refund or bill shall be processed in accordance with the Interconnection Agreement when necessary.
2. Proposer is also responsible for payments to the Company related to service contracts for service power.

SECTION 2 – INTERCONNECTION REQUIREMENTS AND COSTS

The information in Section 2 is based on typical interconnections as shown in the Attachments referenced. Conceptual design is not intended to cover all interconnection requirements. Final interconnection design will be subject to the results of a technical review. The per-unit cost figures below should not be used to create a detailed project estimate. A detailed project estimate typically requires a certain level of engineering to assess project site conditions and to factor in other parameters specific to the project.

The Proposer should identify the components assumed for their project and the quantity assumed for each. Each table below provides notes on the assumptions for each of the unit cost estimates. If a Proposer’s project requirements are different than what is assumed in the notes, the Proposer should identify each difference and provide an estimated additional cost or savings resulting from those differences. Please see Attachment 1 for examples of how to apply the per-unit costs provided. All costs provided are Company costs only and do not include costs related to Proposer responsibilities including, but not limited to, permitting, land rights, community outreach, biological and/or cultural (archeological) surveys. Proposers should do their own due diligence for these costs.

For the purposes of Section 2, voltages are classified as follows:

- Transmission – 69kV

2.1 – SUBSTATION & METER BASELINE COSTS

A. Not Used

B. Not Used

C. Typical Transmission Interconnection

The costs in Section 2.1C are reflective of typical standard interconnections to existing circuits at transmission voltages. Costs for interconnection to specific Company sites are shown in Section 2.2. Costs are for Proposer-Build projects.

Item	Description	Cost
At New 69kV Switching Station		
30	<u>Attachment 2</u> – 69kV Interconnection to an Existing Circuit	\$875,000
Remote Sub Work		
34a	DTT for anti-islanding	\$108,000
<p><u>Notes:</u></p> <ul style="list-style-type: none"> a) Costs provided are in 2022 dollars. b) Includes Company costs for engineering, materials, construction, and testing for Company-responsible items (See Section 3) related to Substation & Meter components as shown in the referenced attachment. 		

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Item	Description	Cost
c)	Item 30 is required for all interconnections to existing 69kV lines. Please contact Company for more information on if Items 34a-c are required for a proposed GCP.	
d)	Does NOT include T&D, Project Management, Telecommunications, or Security costs.	
e)	Civil infrastructure and space for COIF for Item 30 provided by Proposer.	
f)	Substation relay protection requirements have not been identified so costs are based upon typical line protection relaying requirements.	
g)	Does not include costs for permitting, land rights, or a Relay Coordination Study.	
h)	For T&D costs (including service power costs) – See Section 2.3.	
i)	For Project Management costs – See Section 2.4.	
j)	For Telecommunications costs – See Section 2.5.	
k)	For Security requirements – See Section 2.6.	

2.2 – INTERCONNECTION TO SPECIFIC COMPANY SITES

Section 2.2 includes baseline costs for interconnection at specific Company sites identified in the RFP. Attachments 3 and 4 of Appendix H will be provided to Prospective Proposers who request the information via the communication method identified in Section 1.6 of the RFP and upon execution of an NDA as specified in Section 3.12.1 of the RFP. If a site is not specifically identified in the RFP, please use the typical costs in the previous sections for the applicable voltage and project size. Costs are for Proposer-Build projects. See Section 3 for responsibilities.

A. Lahainaluna Substation

Please refer to Attachment 3 for a single line diagram depicting the required interconnection to the Company’s system at Lahainaluna Substation. Costs shown assume a Proposer-Build project.

Item	Description	Cost
41a	Company work for components at the Project Site on the Company side of the demarcation as shown in <u>Attachment 3</u>	\$379,000
41b	Company work for components at Lahainaluna Substation as shown in <u>Attachment 3</u>	\$1,757,000

<p><u>Notes:</u></p> <p>a) Costs provided are in 2022 dollars.</p> <p>b) Includes Company costs for engineering, materials, construction, and testing for Company-responsible items (See Section 3) related to Substation & Meter components as shown in the referenced attachment.</p> <p>c) Does NOT include T&D, Telecommunications, or Security costs.</p> <p>d) Civil infrastructure and space for COIF for Item 41a provided by Proposer.</p> <p>e) Substation relay protection requirements have not been identified so costs are based upon typical line protection relaying requirements.</p> <p>f) Does not include costs for permitting, land rights, or a Relay Coordination Study.</p>		
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Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Item	Description	Cost
g)	For T&D costs (including service power costs) – See Section 2.3. Add Item 131 for T&D Baseline cost.	
h)	For Project Management costs – See Section 2.4.	
i)	For Telecommunications costs – See Section 2.5.	
j)	For Security requirements – See Section 2.6.	
k)	For typical durations to support Proposer-Build facilities – See Section 4.3.	
l)	For additional durations to interconnect at Lahainaluna Substation – See Section 4.4.	

B. Kealahou Substation

Please refer to Attachment 4 for a single line diagram depicting the required interconnection to the Company’s system at Kealahou Substation. Costs shown assume a Proposer-Build project.

Item	Description	Cost
42a	Company work for components at the Project Site on the Company side of the demarcation as shown in <u>Attachment 4</u>	\$379,000
42b	Company work for components at Kealahou Substation as shown in <u>Attachment 4</u>	\$1,757,000

Notes:

- a) Costs provided are in 2022 dollars.
- b) Includes Company costs for engineering, materials, construction, and testing for Company-responsible items (See Section 3) related to Substation & Meter components as shown in the referenced attachment.
- c) Does NOT include T&D, Telecommunications, or Security costs.
- d) Civil infrastructure and space for COIF for Item 42a provided by Proposer.
- e) Substation relay protection requirements have not been identified so costs are based upon typical line protection relaying requirements.
- f) Does not include costs for permitting, land rights, or a Relay Coordination Study.
- g) For T&D costs (including service power costs) – See Section 2.3. Add Item 131 for T&D Baseline cost.
- h) For Project Management costs – See Section 2.4.
- i) For Telecommunications costs – See Section 2.5.
- j) For Security requirements – See Section 2.6.
- k) For typical durations to support Proposer-Build facilities – See Section 4.3.
- l) For additional durations to interconnect at Kealahou Substation – See Section 4.4.

C. Waena Switchyard – FIRM GENERATION ONLY

Please refer to Attachment 5 for a single line diagram depicting the required interconnection to the Company’s system at Waena Switchyard. Costs shown assume a Proposer-Build project.

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Item	Description	Cost
50a	Company work for components at the Proposer’s substation for monitoring and control	\$386,000 /site
50b	Company work for components at Waena Switchyard as shown in <u>Attachment 5</u>	\$1,176,000 /interconnection
<p><u>Notes:</u></p> <ul style="list-style-type: none"> a) Costs provided are in 2023 dollars. b) Includes Company costs for engineering, materials, construction, and testing for Company-responsible items (See Section 3) related to Substation & Meter components as shown in the referenced attachment. c) Does NOT include T&D, Telecommunications, or Security costs. d) Item 50a required if Proposer’s substation is not located adjacent to Waena Switchyard. e) Civil infrastructure and space for COIF for Item 50a provided by Proposer. f) Substation relay protection requirements have not been identified so costs are based upon typical line protection relaying requirements. g) Does not include costs for permitting, land rights, or a Relay Coordination Study. h) For T&D costs (including service power costs) – See Section 2.3. Add Item 131 for T&D Baseline cost. i) For Project Management costs – See Section 2.4. j) For Telecommunications costs – See Section 2.5. k) For Security requirements – See Section 2.6. l) For typical durations to support Proposer-Build facilities – See Section 4.3. m) For additional durations to interconnect at Waena Switchyard – See Section 4.4. 		

2.3 – T&D BASELINE AND LINE EXTENSION COSTS

A. Not Used

B. Not Used

C. Typical Transmission Interconnection Baseline

The costs in Section 2.3C are the baseline T&D costs for interconnections at transmission voltages. It includes 100ft of OH or UG line extension. For any extensions > 100ft, please add costs per Section 2.3D. Costs are for Proposer-Build projects.

Item	Description	Cost
130	69kV OH Final Tap by Company (<u>Attachment 2</u>) <ul style="list-style-type: none"> • Includes 2 wood poles, 1 span (100ft) OH line extension from each new pole toward Proposer facility and the removal of existing conductors between the new poles 	\$144,000

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Item	Description	Cost
131	69kV OH Final Span for Termination to Existing Substation by Company (Attachments 3-4) <ul style="list-style-type: none"> Includes 1 span (100ft) of 69kV conductors and 2 spans (100ft each) of shield wire from last pole to substation termination structure 	\$59,000 each
<p><u>Notes:</u></p> <ul style="list-style-type: none"> a) Costs provided are in 2022 dollars. b) Includes Company costs for engineering, materials, construction, and testing of Company-responsible items. See Section 3 for Proposer-Build responsibilities. c) Interconnection will typically require one of these items depending on the existing facilities in the area and/or the type of construction for any line extension. d) OH or UG line extensions (if > 100ft) – Add applicable costs per Section 2.3D. e) OH/UG route and civil infrastructure drawings provided by Proposer. f) Civil infrastructure (pads, MH/HHs, conduits, etc.) is designed, procured, and installed by Proposer. g) Includes review of Proposer civil infrastructure designs and materials and inspection of Proposer civil infrastructure construction. h) Does not include vegetation clearing, grading, dewatering, permitting or land rights. 		

D. Line Extensions and Upgrades

The costs in Section 2.3D are typical per unit costs for T&D line extensions using typical assumptions based on the Company’s current standards and practices. Costs are for Proposer-Build projects.

69kV

Item	Description	Cost
160	Additional 100ft 69kV OH Line Extension	\$3,300 each
161	Additional 100ft 69kV UG Line Extension	\$5,700 each
165	69kV overbuild on existing accessible 12kV (200ft spans)	\$1,293,000 / mile
166	69kV overbuild on existing inaccessible 12kV (250ft spans)	\$2,191,000 / mile
170	Upgrade existing 69kV OH lines (250ft spans, accessible)	\$744,000 / mile
<p><u>Notes:</u></p> <ul style="list-style-type: none"> a) Costs provided are in 2022 dollars. b) OH/UG route and civil infrastructure drawings provided by Proposer. c) Civil infrastructure (pads, MH/HHs, conduits, etc.) designed, procured, and installed by Proposer. d) Does not include vegetation clearing, grading, dewatering, permitting or land rights. e) Includes Company costs for Company-responsible items – See Section 3. f) Items 160 and 161 should be added to the T&D baseline costs for each additional 100ft of Proposer-Build OH or UG line that does not involve Company’s existing energized facilities. Includes review and inspection of Proposer design/construction. g) Items 165 and 166 includes Company costs to design/construct an OH line extension above Company’s existing energized facilities and assumes all poles need to be replaced. 		

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Item	Description	Cost
h)	Item 170 includes Company costs to reconductor an existing Company line to a larger size as determined by the SIS and assumes no poles need to be replaced.	

E. Service Power

Section 2.3E provides typical requirements and costs for distribution-level service power to the Proposer’s facility and/or the proposed Company switching station. Execution of a proposal letter provided by Company in response to Proposer’s electrical service request, and separate from the Interconnection Agreement, will be required for service power.

Service power to the Proposer’s facility shall emanate from an existing distribution line via new Company overhead and/or underground facilities to the Proposer’s service connection point.

Item	Description	Cost
188	Facility or Station Service Power <ul style="list-style-type: none"> Includes 100ft UG 12kV line extension of two (2) feeders and one (1) padmount transformer and assumes no switchgear is required 	\$84,000 each
189	Distribution OH accessible (200ft spans, #1/0 AAC)	\$719,000 / mile
190	Distribution OH underbuild accessible (200ft spans, #1/0 AAC)	\$441,000 / mile
191	Distribution OH inaccessible (250ft spans, #1/0 AAC)	\$1,382,000 / mile
192	Distribution UG double feeder (200ft spans, #2 AL XLPE)	\$1,048,000 / mile
193	Distribution 3ph double riser w/ fuses (including pole/anchor)	\$41,000 each

Notes:

- a) Costs provided are in 2022 dollars.
- b) OH/UG route and civil infrastructure drawings provided by Proposer.
- c) Civil infrastructure (pads, MH/HHs, conduits, etc.) is designed, procured, and installed by Proposer.
- d) Does not include vegetation clearing, grading, dewatering, permitting or land rights.
- e) Includes engineering, materials, construction labor for electrical work, and inspection for UG civil infrastructure.
- f) OH line extension – Add applicable costs per Items 189-191.
- g) UG line extension (if > 100ft) – Add costs per Item 192.
- h) Additional OH/UG transitions – Add costs per Item 193.
- i) OH assumes wood poles and 3ph overhead conductor with neutral underbuild.
- j) Item 190 assumes no poles need to be replaced.
- k) Accessible assumes vehicles can be used during construction.
- l) Inaccessible assumes helicopters are needed during construction.

For 69kV interconnections, the cost for primary and backup station power is included in the Substation baseline costs in Section 2.1B and assumes distribution-level service is not needed or preferred for station power.

2.4 – PROJECT MANAGEMENT BASELINE COSTS

Section 2.4 provides typical Project Management costs for interconnection projects which require a dedicated project manager. The total costs will be dependent on the Proposer’s schedule and durations for engineering, construction, and testing/closeout.

A. Not Used

B. Not Used

C. Transmission Projects

Item	Description	Cost
197	Engineering Phase <ul style="list-style-type: none"> Includes facilitation, coordination, and support for Engineering Design and Procurement periods 	\$18,300 / month
	Construction Phase <ul style="list-style-type: none"> Includes facilitation, coordination, and support from the start of construction through back feed (energization) 	\$23,000 / month
	Testing/Closeout Phase <ul style="list-style-type: none"> Includes facilitation, coordination and support for Developer system testing and CSAT 	\$11,700 / month
Notes: a) Costs derived using 2022 rates. b) Total costs are tied to schedule and duration of the entire project. c) The Closeout Phase shall extend 4 months past GCOD.		

2.5 – TYPICAL TELECOMMUNICATIONS REQUIREMENTS AND COSTS

Section 2.5 provides typical telecommunications requirements and costs for interconnection projects. The communications equipment will require a communications channel(s). Some options include lease line, fiber, or microwave.

A. Not Used

B. Variable Projects ≥ 1 MW and ≤ 3 MW

1. Primary communications links can consist of lease line, licensed radio, fiber, or microwave.
2. Back-up communications links are optional (can consist of lease line, licensed radio, fiber, or microwave).
3. Additional analog leased telephone lines are required to support revenue meters (Proposer shall do their own due diligence for costs on this).

C. Variable Projects > 3 MW

1. Primary communications links can consist of lease line, fiber, or microwave.
2. Back-up communications links are required (can consist of lease line, licensed radio, fiber, or microwave).
3. Back-up communications links must be transport diverse until the “last mile” for projects greater than 10MW.
4. Additional analog leased telephone lines are required to support revenue meters (Proposer shall do their own due diligence for costs on this).

D. Firm Projects

1. Primary communications links must be Company-owned fiber or microwave.
2. Back-up communications links are required (can consist of leased line or Company-owned fiber or microwave).
3. For interconnection to a new Company switching station, primary and back-up communications links must be transport diverse, with a minimum separation of 6 feet, to the new Company switching station.
4. For interconnection to an existing Company switching station, primary and back-up communications links must be transport diverse, with a minimum separation of 6 feet from the existing Company switching station to the Proposer’s substation.
5. Additional analog leased telephone lines are required to support revenue meters (Proposer shall do their own due diligence for costs on this).

E. Projects Interconnecting to a Company Switching Station

1. If Proposer’s substation is not adjacent to the proposed Company switching station, then Proposer is responsible for providing the communications links between the two (2) sites.
 - a. If Proposer chooses to run fiber between the sites, Proposer will own the fiber from their site up to a splice box immediately outside of the Company switching station (“meet point”). Company will own fiber from the meet point to the termination into the Company switching station – See Item 220.
 - b. All UG infrastructure will be designed, procured, and constructed by Proposer.
 - c. If interconnection is to a new Company switching station, a communications cabinet may be required at both sites – See Item 202.
 - d. If interconnection is to an existing Company switching station, a new communications cabinet will be required at the Proposer’s substation and may be required at the existing Company switching station.
2. If Proposer’s substation is adjacent to the proposed Company switching station, no additional Company costs are anticipated to be required for the Proposer’s substation.

F. Telecommunications Baseline Costs

The costs below are high level per unit costs for communications requirements in support of the Project. Sections 2.5A through 2.5E above provide typical scenarios of when these options may be utilized.

Communications Cabinet or Enclosure

Item	Description	Cost
201	Communications Cabinet with circuits to support SCADA (Projects ≥ 1 MW and ≤ 3 MW) <ul style="list-style-type: none"> Projects with SCADA and DTT but no diverse communication circuits 	\$164,000 / site
202	Communications Cabinet with circuits to support SCADA, Relay Protection, monitoring devices, etc. <ul style="list-style-type: none"> Projects with SCADA, DTT, and diverse communication circuits 	\$192,000 / site

Notes:

- a) Costs provided are in 2022 dollars.
- b) All projects that require communications will require facilities to store the communications equipment. The examples above are provided but other alternatives may be available upon request.
- c) Cabinet is used to support Company equipment and capable of providing communications circuit for SCADA, DTT, monitoring devices, etc.
- d) Communications cabinet cost does not include fiber, microwave equipment or lease circuits.
- e) Proposer will provide all conduits, foundations, HHs, AC power, grounding as required per Company standards.

Lease Line Options

Item	Description	Cost
205	Lease Line one-time and recurring costs	Will vary based on 3 rd party provider

Notes:

- a) Add cost of Communications Cabinet – See Items 201-202.
- b) Check with Company to understand the current lease line requirements.
- c) Communication circuit requirements will be based on applications needed for the project.
- d) Company can provide communication circuit interconnection requirements and assist with review of circuit order from the 3rd party provider as needed.
- e) Proposer to work directly with 3rd party provider if a lease line circuit is needed.
- f) Cost will be the responsibility of the Proposer and is to be negotiated with the 3rd party provider.

Fiber-Optic Cable Option

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Item	Description	Cost
210	New Fiber-only pole line (200' avg spans, 60-strand ADSS) <ul style="list-style-type: none"> Includes new wood poles 	\$312,000 / mile
211	Fiber underbuild on new or existing pole line (200' avg spans, 60-strand ADSS) <ul style="list-style-type: none"> Assumes no replacements of existing poles are needed 	\$166,000 / mile
<p><u>Notes:</u></p> <p>a) Costs provided are in 2022 dollars. b) Add cost of Communications Cabinet – See Items 201-202. c) Assumes no splices are needed along the route.</p>		

Microwave Option

Item	Description	Cost
215	Point-to-Point Microwave Link <ul style="list-style-type: none"> Includes 2 each antenna equipment to create a radio link 	\$697,000 / link
216	50ft Microwave Tower	\$612,000 each
217	100ft Microwave Tower	\$888,000 each
<p><u>Notes:</u></p> <p>a) Costs provided are in 2022 dollars. b) Add cost of Communications Cabinet – See Items 201-202. c) Assumes there is radio line-of-site clearance between the communication endpoints. d) Assumes FCC licensed microwave frequencies are available. e) Assumes there are existing structures/buildings with space available on both ends to house the radio equipment. f) Assumes Telecommunications grounding standards are up to date at both sites. g) Assumes 48 V DC power with 12-hour battery backup is available. h) Does not include special site-specific permit/approval activities that may be required including, but not limited to, Neighborhood Board(s), Conservation District Use Application, Environmental Assessment, Shoreline Management Area approval, biological (endangered species or habitat) surveys, and/or cultural (archeological) surveys or the cost of any migration required for approvals to be granted. Proposers should conduct their own due diligence for these costs. i) Assumes space is available at both ends to construct antenna towers or structures that are rated to survive a Saffir-Simpson category 4 hurricane. j) Other options for Microwave Towers of varying heights may be available.</p>		

Projects Interconnecting to a Company Switching Station Only

Item	Description	Cost
220	Fiber from “meet point” to termination in Company switching station <ul style="list-style-type: none"> Assumes 24-strand fiber cable. Includes splicing, termination, and testing work. Civil infrastructure (HHs, conduits, etc.) is designed, procured, and installed by Proposer. 	\$31,000

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Item	Description	Cost
<p>Notes:</p> <ul style="list-style-type: none"> a) Costs provided are in 2022 dollars. b) Required if the Proposer’s substation is not adjacent to the Company switching station per Section 2.5E. c) Assumes the “meet point” is within 500ft of the termination in the Company switching station. 		

2.6 – TYPICAL SECURITY REQUIREMENTS AND COSTS

Section 2.6 provides typical security requirements and costs for new facilities installed as a part of the interconnection. Security requirements and costs can vary based on many factors including, but not limited to, location, crime rate, environment, aspects of the surrounding area, terrain, accessibility, layout of the facility, etc. The specific requirements for each facility will be subject to final review during the design and engineering phase. Additional information, including the Company’s Physical Security Strategy, is available upon request after execution of an NDA with the Company.

A. Proposer Responsibilities at Proposer Facility

The Proposer shall be responsible to incorporate security components and systems for **their facilities** that consider the Security Guidelines for the Electricity Sector (CIP-014-2): Physical Security, as published by the North American Electric Reliability Corporation (NERC) and that at a minimum, meet the requirements below.

For Company-owned facilities within the Proposer’s Facility, Company requires:

1. Standard 8ft high security fence with 3-strand barbed wire V-top.
2. Interior mounted 4’ high cattle fencing.
3. All gates will be secured using a proprietary padlock system.
4. Proposer-owned cabinets/enclosures housing Company equipment shall be secured with a lock provided by Company.
5. Company requires 24/7 access to Company facilities within the Proposer facility.

B. Proposer Responsibilities for New Company-Owned Substations

Company-owned substations interconnecting firm generation typically require high levels of security due to the critical role they play in the Company’s system which may include, but is not limited to:

1. Camera Monitoring – Proposer to procure and install all camera mounts and cameras. Specific models required for cameras, mounts, caps, and other associated hardware will be provided to Proposer after an NDA is executed with the Company. Company’s Security Integrator will terminate cables, adjust, and optimize as needed.
2. Electronic Card Access System – For control & microwave houses, Proposer procures/mounts card access devices and installs any cables necessary. Company

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

- Security Integrator will terminate cables and program and test devices and peripherals.
3. Infrastructure – Conduits and associated electrical and junction boxes shall be installed by the Proposer as a part of the substation site development. Conduits shall be rigid PVC, dedicated for Security systems purposes only, and sealed properly from the origin to the termination point.
 4. Cabling – Cabling shall be installed by the Proposer as a part of the substation site development and shall be of the type specified below for the applicable voltage. Company’s Security Integrator will terminate both ends.
 - a. 69kV Substations – CAT 5E
 - b. 138kV Substations – CAT 6
 5. Integrator – Company’s Security Integrator will procure the server and necessary switches, terminate all ends, program the server, and set all fields of view for all camera shots.
 6. Fencing – Schedule 40 galvanized fence post and fence fabric is required for fencing. The fencing shall be 8 feet high with heavy gauge support wire along the length of the bottom. 3-strand barbed wire shall be mounted atop the fence at a 45-degree angle on the inside and outside for the entire length of fence and gates.
 7. Locks – All gates shall be secured using a proprietary padlock system. Company will provide physical padlocks for gates and electrical equipment.
 8. Lighting – Motion and static lighting are necessary for additional safety and security deterrent measures and to enhance camera viewing at night. Proposer shall procure and install all lighting as a part of the substation site development. Motion LED lighting arrays shall be placed on all corners and entrances. Static LED lighting arrays shall be placed on the control house and throughout the yard to meet required lighting levels. Lighting shall be Dark Sky compliant.
 9. Perimeter Intrusion Detection (138kV only) – Proposer shall procure and install devices and cables using a contractor that is trained and qualified to install the specified system. Company’s Security Integrator will terminate cables, program, and test system. The specific models for the system will be provided to Proposer after execution of an NDA with the Company.

The costs below are the Company costs for the Company-responsible items above.

Item	Description	Cost
250	69kV Substation Security	\$54,000 / site
<p><u>Notes:</u></p> <ol style="list-style-type: none"> a) Costs provided are in 2022 dollars. b) Includes Company costs for internal labor, materials, and contractors to support design, installation, programming, and testing of all security systems. c) Location has flat terrain, is accessible, and is rural with a moderate to low crime rate and little to no homeless population. d) Fire break is not needed. 		

SECTION 3 – PROPOSER-BUILD RESPONSIBILITIES

Section 3 defines Company and Proposer responsibilities for Proposer-Build interconnections.

3.1 – COIF AT PROPOSER SITE

Company will perform the following:

1. Review and approval of Proposer drawings and material selection.
2. Inspect Proposer construction.
3. Programming and functional testing of digital devices (i.e., DFR, RTU, etc.).
4. Terminate wiring between RTU and IPP interface cabinet.
5. Perform acceptance testing.
6. Procurement, installation, and testing of revenue meters.

Proposer is responsible for the following:

1. Design, procurement, and construction of:
 - a. All COIF except what is identified above.
 - i. Pull wiring between RTU and IPP interface cabinet and coil up on both ends.
 - b. All civil infrastructure (conduits, equipment pads, etc.) at the Proposer facility.
2. As built drawings prior to acceptance testing.

3.2 – COIF AT EXISTING COMPANY-OWNED SUBSTATIONS

Company will perform all engineering, material procurement, and construction at existing Company-owned substations except as described below.

1. For an UG termination into an existing substation, Proposer is responsible for design, procurement, and construction of the UG T&D lines and associated civil infrastructure up to the termination on the riser structure.

3.3 – T&D LINE WORK

Company will perform the following:

1. Review and approve Proposer drawings.
2. Inspection of Proposer construction.
3. Design, procurement, and construction of electrical facilities for the final tap at the GCP.
4. Design, procurement, and construction of electrical facilities within the existing Company right-of-way (i.e., where Company's energized facilities are).
5. Procurement does not include the conductors or cable required for the last span as discussed below.
6. Break into Company's existing UG facilities for interception point (i.e., at an existing MH/HH/vault)

Proposer is responsible for the following:

Hawaiian Electric Company
Company-Owned Interconnection Facilities Cost and Schedule Information

1. Route design of the OH or UG lines (locations of poles, MHs, HHs, vaults, conduits, equipment, etc.).
2. Design, procurement, and construction of:
 - a. All civil infrastructure (vaults, manholes, conduits, equipment pads, etc.) between the Proposer facility and the GCP.
 - b. All electrical facilities from the Proposer facility up to and including the last pole or manhole/vault prior to existing Company facilities.
3. For OH to existing OH final tap
 - a. Coil enough OH conductor on the last pole for Company to string and terminate the last span of conductor to the GCP.
4. For UG tap to existing OH final tap
 - a. Stub-up the riser conduit above ground level at the bottom of the riser pole.
 - b. Pull cable to the last MH/HH/vault prior to the riser.
 - c. Provide enough cable for Company to make the last pull up the riser and terminate the cables.
5. For UG tap to existing UG
 - a. Conduits to connect to interception point provided by Company.
 - b. Pull cable to the last MH/HH/vault prior to intercepting Company's existing facilities.

3.4 – TELECOMMUNICATIONS

Company will perform the following:

1. Review and approval of Proposer drawings.
2. Design, procurement, installation, and testing of network equipment such as routers, multiplexers and associated hardware required at Proposer Site, Company Switching Station and/or Remote Substation Facilities to provision circuits required for the project.
3. Design, procurement, and installation of fiber termination equipment within Company owned or managed facilities at Proposer Site, Company Switching Station and/or Remote Substation Facilities, as needed, to support the communication requirements.
4. Design, procurement, and installation of microwave radio within Company owned or managed facilities at Proposer Site, Company Switching Station and/or Remote Substation Facilities, as needed, to support the communication requirements.

Proposer is responsible for the following:

1. Preparation of drawings related to the installation of telecommunication equipment to be turned over for Company ownership and/or Company management, including telecommunications cabinets and/or racks and telecommunications power.
2. Design, procurement, and installation of telecommunications cabinets and/or racks at the Proposer site and/or Company Switching Station to support the telecommunications equipment, as well as supporting equipment including air conditioning, alarming equipment, ground bars and fuse panels.
3. Design, procurement, and installation of equipment at the Proposer site and/or Company Switching Station to support telecommunications power requirements,

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

including, but not limited to, batteries, battery racks, rectifiers, and distribution panels.

4. Design, procurement, and installation of fiber cable, as needed, to support communications requirements, including SCADA connection from the Developer’s RTU to the Company’s RTU.
5. Ordering and installation of leased services, as needed, to support communications requirements.

3.5 – SECURITY

Responsibilities for Proposer-Build projects are the same as for Company-Build projects. See Section 2.6 for those responsibilities.

SECTION 4 – TYPICAL COMPANY DURATIONS FOR INTERCONNECTION PROJECTS

The tables below in Section 4 are to be used as a reference when developing an overall project schedule to assist Proposers in setting realistic durations and deadlines for critical milestones. These tables represent typical durations for the Company to complete the listed critical milestones that assist in moving the interconnection project through the IRS, Engineering, Procurement, and Construction phases. The durations below do not include time for Proposer to complete items they are responsible for. These high-level typical durations are for planning purposes only and is not intended to cover all project specific requirements. Specific project details can increase or decrease these durations. The detailed project schedule will be determined after the IRS is completed.

4.1 – NOT USED

4.2 – NOT USED

4.3 – TRANSMISSION PROJECTS

Milestone	Duration Proposer-Build	Notes
IRS Phase		
Model Validation	1 month	May increase depending on # of iterations
System Impact Study (SIS)	150 calendar days	Following Model Acceptance
Facility Study (FS)	40 business days	Following completion of SIS, SLD Acceptance, and Receipt of Developer Drawings and Schedules
Engineering Phase		
30% Design & Review	20 business days	
60% Design & Review	20 business days	Following 30% Design acceptance.
90% Design & Review	20 business days	Following 60% Design acceptance
Issued for Construction (IFC) Design & Review	20 business days	Following 90% Design acceptance.

Hawaiian Electric Company
 Company-Owned Interconnection Facilities Cost and Schedule Information

Milestone	Duration Proposer-Build	Notes
Procurement Phase		
Procurement	N/A	Procurement of materials typically happens at 60% design completion
Construction Phase		
Construction	N/A	Based on scope/complexity of work
Acceptance Testing	25 business days	Approximately 3 weeks after construction completion
CSAT	30 business days	To occur after commissioning of Proposer's Facility. Duration depends on Proposer's ability to meet the Performance Standards.
Notes		
a) For Proposer-Build projects, the Engineering Phase includes design reviews of Proposer designs for COIF and review of SOIF supporting/impacting COIF. b) N/A indicates that the task is the responsibility of the Proposer in a Proposer-Build project.		

4.4 – ADDITIONAL DURATIONS TO INTERCONNECT AT AN EXISTING SUBSTATION

Milestone	Duration Company-Build	Notes
Engineering Phase		
30% Design & Review	40 business days	
60% Design & Review	50 business days	Following 30% Design acceptance.
90% Design & Review	50 business days	Following 60% Design acceptance
Issued for Construction (IFC) Design & Review	30 business days	Following 90% Design acceptance.
Procurement Phase		
Procurement	Up to 14 months	Procurement of materials typically happens at 60% design completion and after PUC approval. Material lead times dependent on manufacturer availability.
Construction Phase		
Construction	3 months	Construction to begin after procurement completion.
Notes		
a) The durations listed are in addition to the durations listed in Section 4.3. b) The Engineering Phase includes Company design & review of Company-Owned Interconnection Facilities (COIF) & reviews of Proposer-Owned Interconnection Facilities (SOIF) supporting/impacting COIF.		