

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAI'I

In the Matter of the Application of)	
)	
HAWAIIAN ELECTRIC COMPANY, INC.)	Docket No.
)	
For Approval to Construct a 46 kV Overhead)	
Line Pursuant to HRS 269-27.6 (a))	
for the Wahiawa-Waimano 46 kV Overhead)	
Sub-Transmission Line Relocation, and to commit)	
funds in excess of \$2,500,000)	
(excluding customer contributions))	
<hr/>)	

HAWAIIAN ELECTRIC APPLICATION

VERIFICATION

EXHIBITS I-XII

and

CERTIFICATE OF SERVICE

Tracie M.K. Black
Associate General Counsel

Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawai'i 96840

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_____)	

HAWAIIAN ELECTRIC APPLICATION

TO THE HONORABLE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAI‘I:

HAWAIIAN ELECTRIC COMPANY, INC. (“Hawaiian Electric” or the “Company”) respectfully requests that the Commission: (1) approve the commitment of approximately \$5.2 million in funds for the construction and installation of the Wahiawa-Waimano 46 kV line relocation (“Project”); (2) determine that the Project’s 46kV line, as described later in this Application, be constructed above the surface of the ground, pursuant to Hawai‘i Revised Statutes (“HRS”) § 269-27.6(a) ; and (3) that the Commission conduct a public hearing pursuant to HRS § 269-27.5 for the overhead relocation of an existing 46 kV overhead sub-transmission line.

EXECUTIVE SUMMARY

Castle & Cooke (“Developer” or “Landowner”) has requested that Hawaiian Electric relocate a section of the Company’s existing facilities on the Wahiawa-Waimano 46 kV overhead sub-transmission line located in the Koa Ridge development area (“Koa Ridge”). (*See*

Exhibit I for the Project Location Map and Exhibit VII for the Project Layout). The Developer is in the process of constructing homes and other related facilities in the Koa Ridge area. Hawaiian Electric's existing 46 kV overhead line is located within the Developer's property and will conflict with the Developer's proposed location for a park.

Hawaiian Electric does not have an easement for this existing section of 46kV line. By letter dated August 2, 2019, the Developer formally requested that Hawaiian Electric commence with the relocation of its 46kV overhead line within the Development area.

The new 46kV line alignment will run within a portion of the existing Kahe-Halawa #1 138kV pole line. The 138kV pole line is within Developer property and has an easement. The total Project cost is currently estimated at \$5,181,458. Hawaiian Electric will be responsible for 100% of the cost.

I

APPLICANT

Hawaiian Electric, whose principal place of business and whose executive offices are located at 1001 Bishop Street, Honolulu, Hawai'i 96813, is a corporation duly organized under the laws of the Kingdom of Hawai'i on or about October 13, 1891, and is now existing under and by virtue of the laws of the State of Hawai'i. Hawaiian Electric is an operating public utility engaged in the production, purchase, transmission, distribution and sale of electricity on the island of O'ahu.

II

CORRESPONDENCE

Correspondence and communications in regard to this Application should be addressed to:

Kevin M. Katsura
Director, Regulatory Non-Rate Proceedings
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawai'i 96840-0001

Kevin.Katsura@hawaiianelectric.com
Regulatory@hawaiianelectric.com

III

EXHIBITS

The following exhibits are provided in support of this Application:

- Exhibit I – Project Location Map
- Exhibit II – Parcel and Zoning Information
- Exhibit III – Project Area Photographs
- Exhibit IV – Grant of Easement R/W 1958-100C
- Exhibit V – Customer Request Letter to Relocate Line
- Exhibit VI – Land Purchase Request Letter to Customer and Customer's Response
- Exhibit VII – Project Layout and Typical Pole Framing
- Exhibit VIII – Overhead/Underground Correspondence
- Exhibit IX – Overhead/Underground Cost Comparison
- Exhibit X – Green House Gas Analysis
- Exhibit XI – Bill Impact and Revenue Requirement
- Exhibit XII – Confidentiality Log

Portions of Exhibit VI have been redacted as confidential and unredacted versions of the same will be filed upon the issuance of an appropriate protective order in this docket. The redacted information contains confidential information in the form of negotiating positions and pricing information which, if publicly disclosed, could disadvantage and competitively harm the Companies and other third parties in their current or future negotiations for land purchases or easements.

IV

REQUESTED APPROVALS

A. Hawaiian Electric requests that the Commission issue a decision and order (“D&O”) approving the commitment of funds, currently estimated at \$5.2 million for the construction and installation of the Wahiawa-Waimano 46kV line relocation project, in accordance with Paragraph 2.3(g)(2) of the Commission’s General Order No. 7 (“G.O. 7”), as amended by Decision and Order No. 21002 (“D&O 4 21002”), filed May 27, 2004 in Docket No. 03-0257;

B. HRS § 269-27.6(a) – Construction of 46 kV Lines

Hawaiian Electric requests a determination by the Commission that the proposed 46 kV line relocation be constructed above the surface of the ground pursuant to HRS § 269-27.6(a), which provides that:

Construction of high-voltage electric transmission lines; overhead or underground construction. (a) Notwithstanding any law to the contrary, whenever a public utility applies to the public utilities commission for approval to place, construct, erect, or otherwise build a new forty-six kilovolt or greater high-voltage electric transmission system, either above or below the surface of the ground, the public utilities commission shall determine whether the electric transmission system shall be placed, constructed, erected, or built above or below the surface of the ground; provided that the public utilities commission may in its determination consider the following factors:

- (1) Whether a benefit exists that outweighs the costs of placing the electric transmission system underground;
- (2) Whether there is a governmental public policy requiring the electric transmission system to be placed, constructed, erected or built underground and the governmental agency establishing the policy

- commits funds for the additional costs of undergrounding;
- (3) Whether any governmental agency or other parties are willing to pay for the additional costs of undergrounding;
 - (4) The recommendation of the division of consumer advocacy of the department of commerce and consumer affairs, which shall be based on an evaluation of the factors set forth under this subsection; and
 - (5) Any other relevant factors.

Hawaiian Electric has addressed the considerations set forth in HRS § 269-27.6(a)(1) through (5) as follows:

HRS § 269-27.6(a)(1). The benefit, if any, of placing the overhead 46 kV line underground does not outweigh the cost. Hawaiian Electric estimates that it would cost approximately twice as much to underground this section than to construct it overhead. This is based on an estimated capital cost of \$9,379,901 for an underground 46kV line versus an estimated capital cost of \$5,181,458 for an overhead 46kV line. This estimate assumes an underground 46kV line in the same alignment as the proposed 46kV overhead line. (*See Exhibit IX for the workpapers for the overhead and underground line cost estimates.*) The visual impact will not be significantly increased by the overhead 46kV line since there are existing 138kV overhead lines within the Developer's property. See Exhibit III for digital photographs of the project area.

HRS § 269-27.6(a)(2). Hawaiian Electric is unaware of any governmental public policy requiring the undergrounding of the 46 kV lines.

HRS § 269-27.6(a)(3). As the existing 46kV line does not have an easement, Hawaiian Electric will pay for 100% of the relocation cost. Hawaiian Electric has sent letters to the Developer (Castle and Cooke), the City and County of Honolulu, and the State of Hawaii inquiring as to their willingness to fund the underground transmission lines (*See Exhibit VIII*). Hawaiian Electric will file the responses as part of this

proceeding upon receipt from these entities.

HRS § 269-27.6(a)(4). The position of the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs will be stated upon completion of its investigation.

HRS § 269-27.6(a)(5). There are no other “relevant factors” of which Hawaiian Electric is aware.

C. HRS § 269-27.5 – Public Hearing

Hawaiian Electric requests that the Commission schedule a public hearing pursuant to HRS § 269-27.5, which provides that:

Construction of high-voltage electric transmission lines; hearing. Whenever a public utility plans to place, construct, erect, or otherwise build a new 46 kilovolt or greater high-voltage electric transmission system above the surface of the ground through any residential area, the public utilities commission shall conduct a public hearing prior to its issuance of approval thereof. Notice of the hearing shall be given in the manner provided in section 269-16 for notice of public hearings.

The project area is zoned “A-2” (A-2 Medium Density Apartment), “P-2” (P-2 General Preservation), and “BMX-3” (BMX-3 Community Business Mixed Use). (*See* Exhibit II for Parcel and Zoning information). The closest residence will be approximately 100 feet from the relocated line.

V

COST ESTIMATE

The subject Project has a total estimated cost of \$5,181,458. Since the capital expenditures is greater than \$2.5 million, Commission approval for the commitment of expenditures pursuant to paragraph 2.3(g)(2) of General Order No. 7 is requested.

The Project costs are estimated to include:

	Wahiawa-Waimano 46kV Overhead Sub-Transmission Line Relocation
Engineering	\$394,902
Material	\$1,870,737
Construction	\$1,952,183
AFUDC	\$91,995
Total (Capital)	\$4,309,817
Removals	\$871,641
Total Project Cost	\$5,181,458

VI

PROJECT DESCRIPTION

This Project, at the request of Castle & Cooke, involves the relocation of seventeen (17) spans of the Wahiawa-Waimano 46kV overhead sub-transmission line from existing wood pole P1 to existing wood pole P17. The work will consist of installing thirteen (13) new steel 138kV poles with 46kV underbuild poles, three (3) new steel 46kV poles, 46kV overhead conductors, and shield wire. The materials to be installed are twelve (12) steel poles ranging from 110' to 130' tall, one (1) 85' steel pole, three (3) 55'-tall steel poles, approximately 7,000 circuit feet of 336.4 KCM AAC (all aluminum conductor) 46kV overhead conductors, and 7,000 circuit feet of 195.7 AL AAAC (all aluminum alloy conductor) overhead shield wire. The proposed poles will be 35' to 55' taller than the existing poles and will include the new 46kV conductors below the 138kV conductors. The removal process will involve the removal of sixteen (16) poles and approximately 8,000 circuit feet of 46 kV overhead conductors and 8,000 circuit feet of overhead

shield wire conductor. (See Exhibit III for photographs of the project area and Exhibit VII for the overall project layout).

VII

PROJECT JUSTIFICATION

Castle & Cooke are in the process of constructing homes and other related facilities in the Koa Ridge area. Hawaiian Electric's existing 46 kV overhead line is located within the Developer's property and will conflict with the Developer's proposed location for a park.

Hawaiian Electric does not have an easement for this section of 46kV line. (See Exhibit IV for the Easement Documents). By letter dated August 2, 2019, the Developer formally requested that Hawaiian Electric commence with the relocation of its 46kV overhead line within the Development area (see Exhibit V for the Customer Request Letter to Relocate Line).

The new 46kV alignment will run within a portion of the existing Kahe-Halawa #1 138kV pole line. The 138kV pole line is within Developer property and has an easement. Hawaiian Electric will be responsible for 100% of the cost.

The existing 46kV overhead line has been in service for 48 years and has an average service life of 58 years for depreciation purposes. Given the placement of the existing sub-transmission lines, in the timeframe in which the poles were installed, the landowner would likely have required that Hawaiian Electric include a clause to allow for a one-time relocation of the poles within the easement as a condition for the granting of the easement.

VIII

PROJECT ALTERNATIVES

The Company identified the following alternatives: (1) Undergrounding the 46kV line along Road B in the Koa Ridge Development Area; and (2) Condemning the land beneath the

existing 46kV line. The above alternatives were not selected due to increased cost and delayed schedule in comparison to the proposed Project.

(1) Undergrounding the 46kV line along Road B in the Koa Ridge Development Area

The Company initially considered relocating the 46kV line underground along the Developer's Road B. Due to the Developer's schedule, Hawaiian Electric's work would need to be done in several temporary and permanent phases over the course of several years as the Developer constructs Road B. The projected cost for this option is \$16.561M.

(2) Condemning the land beneath the 46kV line

The Company sent a letter to the Developer to acquire an easement for the existing 46kV line. The Developer declined the Company's offer as the easement would impact the Developers required amount of useable park space, which has previously been agreed to and accepted by the City. (*See Exhibit VI for the Land Purchase Request Letter and the Customer's Response*).

Given the Developer's rejection of the offer, the Company's only remaining option to leave the existing line in place would be to condemn an easement for the existing 46kV line. The option of condemning the property is not reasonable due to the high cost and lengthy process to develop a request for approval of condemnation to file with the Commission and subsequent Circuit Court filing, which would have a negative impact on the Developer's schedule, impact the Company's relationship with the Developer and delay the Developer's ability to bring more homes to the residents of Oahu.

IX

SCHEDULE

Castle & Cooke has requested that the Hawaiian Electric facilities be relocated by the end of 2023. The construction of Hawaiian Electric's facilities for the Project is expected to start in October 2023 and be completed in approximately two months. Hawaiian Electric plans to order the long lead-time materials (e.g., poles & conductor) by October 2022 in order to meet the expected construction start date of October 2023.

X

NON-WIRES ALTERNATIVES

The subject Project involves the Developer requested relocation of seventeen (17) overhead spans of the Wahiawa-Waimano 46 kV sub-transmission line to facilitate the Koa Ridge development. The Company does not recommend removal of this section of 46 kV line in lieu of the proposed Developer requested overhead circuit relocation.

Based on the discussion that follows, the Company respectfully requests that the evaluation of non-wires alternatives ("NWA") for the replacement of the relocated sub-transmission circuit be waived for this Project, or, in alternative, that the Commission determine that NWAs need not be further evaluated for this Project.

An NWA for this proposed relocation project would require the creation of an off-grid electric system sized to serve the worst case normal and contingency loads downstream of the relocated sections. With the current system configuration, this portion of the Wahiawa-Waimano 46kV circuit provides normal power to the Uwapo substation which serves the Mililani Town area.

Through the IGP process, the Company, along with stakeholders developed the *NWA Opportunity Evaluation Methodology* filed on 11/5/2021 with the *Grid Needs Assessment Methodology Review Point* document (Docket 2018-0165) which is to be utilized in assessing NWA opportunities going forward.

As stated in our *Non-Wires Opportunity Evaluation Methodology*, the Company has a three-step methodology for evaluating non-wires opportunities:

- Step 1.** Initial NWA opportunity screen intended to quickly and simply identify “qualified” and “non-qualified” T&D opportunities based on technical requirements and timing of need.
- Step 2.** NWA opportunity sourcing evaluation to prioritize the “qualified” opportunities in terms of the grid project avoided cost (economics), uncertainty regarding timing and/or scope of need, and market potential to support a procurement.
- Step 3.** Action plan to enable a range of potential NWA sourcing options via procurement, programs, and pricing.

This three-step approach is detailed in the figure below.



Figure 1: NWA Opportunity Evaluation Methodology

Step 1:

The intent of Step 1 is to categorize all T&D capital budget projects by applying an opportunity screen to identify those T&D projects that are most suitable for further NWA opportunity evaluation. T&D projects with the greatest NWA opportunity include the following three grid needs categories:

1. Expansion of distribution system capacity to meet load and/or hosting capacity needs
2. Reliability requirement for circuit back-tie upgrade deferral
3. Enhancing system resilience

Conversely, certain T&D projects cannot or are unlikely to be deferred/avoided by DER. These “required” projects include those necessary to comply with public works, or other customer requests, including, but not limited to:

- Line/pole relocation or undergrounding due to street widening, relocation clauses, or overhead-to-underground conversions
- Emergency and preventative equipment and infrastructure replacement to restore power after outages, avoid outages, avoid catastrophic failures, and ensure public safety
- Replacement of physical apparatus, such as circuit breakers, relays, and transformers, because of asset condition
- Replacement of damaged or failed equipment/poles/conductor
- New customer requests for new physical connection to the electric grid

Step 2:

The intent of this second step is to evaluate candidate T&D NWA opportunities in greater detail to identify those with the highest likelihood of success and related solution sourcing

option(s). This NWA evaluation is technology agnostic consistent with the Company's IGP process. The following four equally weighted criteria will be used to evaluate NWA opportunities:

- Performance requirements in relation to engineering and operational performance requirements of the identified T&D grid need
- Forecast certainty of the forecast scope and timing of the grid need
- Project economics in terms of the deferral value of a qualified T&D capital project and any other relevant avoided costs to determine sourcing options
- Market assessment based on the potential for successful NWA procurement versus programs or retail pricing options in the immediate local area related to the grid need

Step 3:

The T&D Action Plan assigns specific T&D projects into one of three Action Plan tracks.

- **Track 1:** Procurement of large, certain opportunities (that is, greater than \$1 million in economic value with in-service need in 2 to 5 years) with high likelihood of NWA success for procurement (that is, performance and market).
- **Track 2:** Procurement if factors indicate reevaluating in the future for potential procurement (that is, greater than \$1 million in value and timing and uncertainty of grid need); a program if the opportunity is certain with greater than \$1 million in value, is considered cost-effective for customers, and performance can likely be met (for example, new real estate developments); and pricing if the economic value is less than \$1 million and potential timing of need is sufficiently long to account for customer adoption, which may be longer than a targeted program.

- **Track 3:** Non-qualified opportunities that have criteria (for example, performance, timing, or economics) that cannot be reasonably met by NWA solutions. In these instances, the wires solution will be implemented

The Action Plan will include a summary list of T&D project opportunities evaluated and the proposed course of action on solutions for each grid need.

As previously described, this Project is to relocate a section of the Wahiawa-Waimano 46kV circuit. This project can be screened out with Step 1 of the *Non-Wires Opportunity Evaluation Methodology* and placed in the category of T&D projects that cannot or are unlikely to be deferred/avoided by DER.

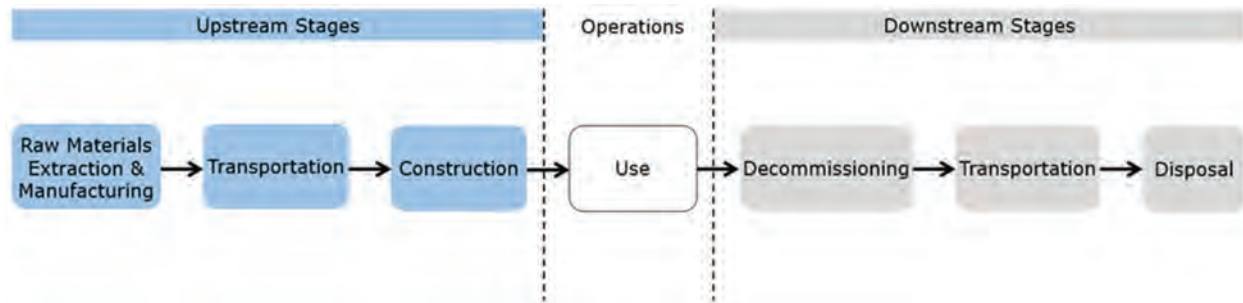
XI

GREEN HOUSE GAS EMISSIONS ANALYSIS

This greenhouse gas (“GHG”) analysis (“Analysis”) addresses the relocation of the Wahiawa-Waimano 46 kV overhead transmission line. It includes the removal and replacement of aluminum conductor, and replacement of steel and wood poles. This lifecycle greenhouse gas emissions analysis is being provided pursuant to HRS §269-6(b) and was performed by Ramboll US Consulting, Inc. (“Ramboll”).

The Project Lifecycle GHG Emissions account for all lifecycle stages (raw materials and extraction, transportation, construction, operations & maintenance, and decommissioning & disposal) that would result from the Project for the duration of the Project Lifetime.

Figure 1. Stages for Consideration in Project GHG Emissions Calculations



As part of this Analysis, Ramboll reviewed an extensive body of peer-reviewed literature for transmission and distribution (“T&D”) infrastructure systems to develop GHG emissions estimates based on the best reasonably-available public data that has undergone scientific peer-review. The Analysis is also based on the most current information, including emission factors, available to Ramboll at the time the Analysis was completed. Where practicable and reasonably estimable, this information was localized to account for unique location-specific factors applicable to a project located on O‘ahu.

Ramboll previously performed GHG analyses for eleven individual comparable T&D projects based on project-specific inputs for those projects. These eleven projects are similar in scope to the Koa Ridge Line B Relocation Project. Based on the results from these comparable projects, Ramboll identified the equipment that comprise the bulk of GHG emissions on those projects, which is referred to as Major Equipment.¹ The GHG emissions from raw material extraction and manufacturing (“RMEM”) and decommissioning & disposal (“D&D”) from Major Equipment accounted for 90% to 100% of the total RMEM and D&D Stage Emissions in each of the previous projects. Therefore, the low range of Project GHG Emissions for each stage

¹ Major Equipment refers to the list of equipment that comprises the bulk of emissions in previous T&D GHG analyses done for Hawaiian Electric, along with any equipment or materials that can be readily modeled based on Project-specific inputs from the initial list of equipment. The Major Equipment includes T&D conductors, fiber optic cables, wood poles, steel poles, PVC conduit duct, concrete and thermal backfill.

of this Analysis assumes that Major Equipment accounts for all (100%) of emissions for the stage, while the high range assumes that the same total of Major Equipment emissions accounts for 90% of the emissions and miscellaneous (non-major) equipment² contribute 10% of Project GHG Emissions for the stage.

Similarly, the Transportation Stage emissions from Major Equipment accounted for at least 89% of the total Transportation Stage Emissions in each of the previous projects.

Therefore, the low range of Project Transportation GHG Emissions for this Analysis assumes Major Equipment accounts for 100% of Project Transportation GHG Emissions, while the high range assumes Major Equipment accounts for 89% and miscellaneous equipment contributes 11% of Project Transportation GHG Emissions.

The Koa Ridge Line B Relocation Project-specific inputs for the Major Equipment were used to calculate Project emissions for the RMEM, Transportation and D&D lifecycle stages, as detailed above. Project-specific inputs were also used to calculate emissions for Construction and Project Operations lifecycle stages, as detailed below.

The Construction GHG Emissions for the Project were calculated based on Construction GHG Intensities from each of the previous eleven T&D Projects in metric tons (“MT”) carbon dioxide equivalents (“CO₂e”) per construction days. Ramboll analyzed the Construction GHG Emissions as a range of low to high based on the lowest and highest Construction GHG Intensities determined for the previous T&D projects. Given, however, that helicopter off-road emissions may contribute significantly to the total Lifecycle GHG Emissions, construction emissions from helicopter usage were modeled separately and added to the range of low to high intensities to calculate the Project Construction GHG Emissions.

² Miscellaneous Equipment emissions account for the percentage of Total T&D Emissions that are not covered under the Major Equipment emissions for each previous T&D GHG analysis done for Hawaiian Electric.

The Project Operations GHG Emissions are based on annual truck trips specific to this Project thus a low to high range was not required.

The Project Lifecycle GHG Emissions low and high range results are obtained by summing the low and high GHG Emissions for each stage of the Project lifecycle based on the percentage contributions that were assumed from the previous projects. Based on this approach, Ramboll has estimated that the Project Lifecycle Emissions ranges from 1,127 to 1,303 metric tons (“MT”) carbon dioxide equivalents (“CO₂e”). See Table 1 in Exhibit X for a tabular presentation of the emissions.

XII

BILL IMPACT

The Company estimates that the average monthly bill impact for this Project for a typical residential customer using 500 kWh will be \$0.02, based on the revenue requirements associated with the cost of the Project shown in Exhibit 11 to this Application.

XIII

CONCLUSION

Wherefore, Hawaiian Electric respectfully requests that the Commission:

- (1) approve the commitment of funds, currently estimated at approximately \$5.2 million, for the construction and installation of the Wahiawa-Waimano 46 kV line relocation project, in accordance with G.O. 7 Paragraph 2.3(g)(2), as amended by D&O 21002;
- (2) determine that the proposed relocation of 46 kV line, as described in Section IV-B of this Application, be constructed above the surface of the ground, pursuant to HRS § 269-27.6 (a);

(3) conduct a public hearing pursuant to HRS § 269-27.5 for the overhead relocation of an existing 46 kV overhead sub-transmission line; and

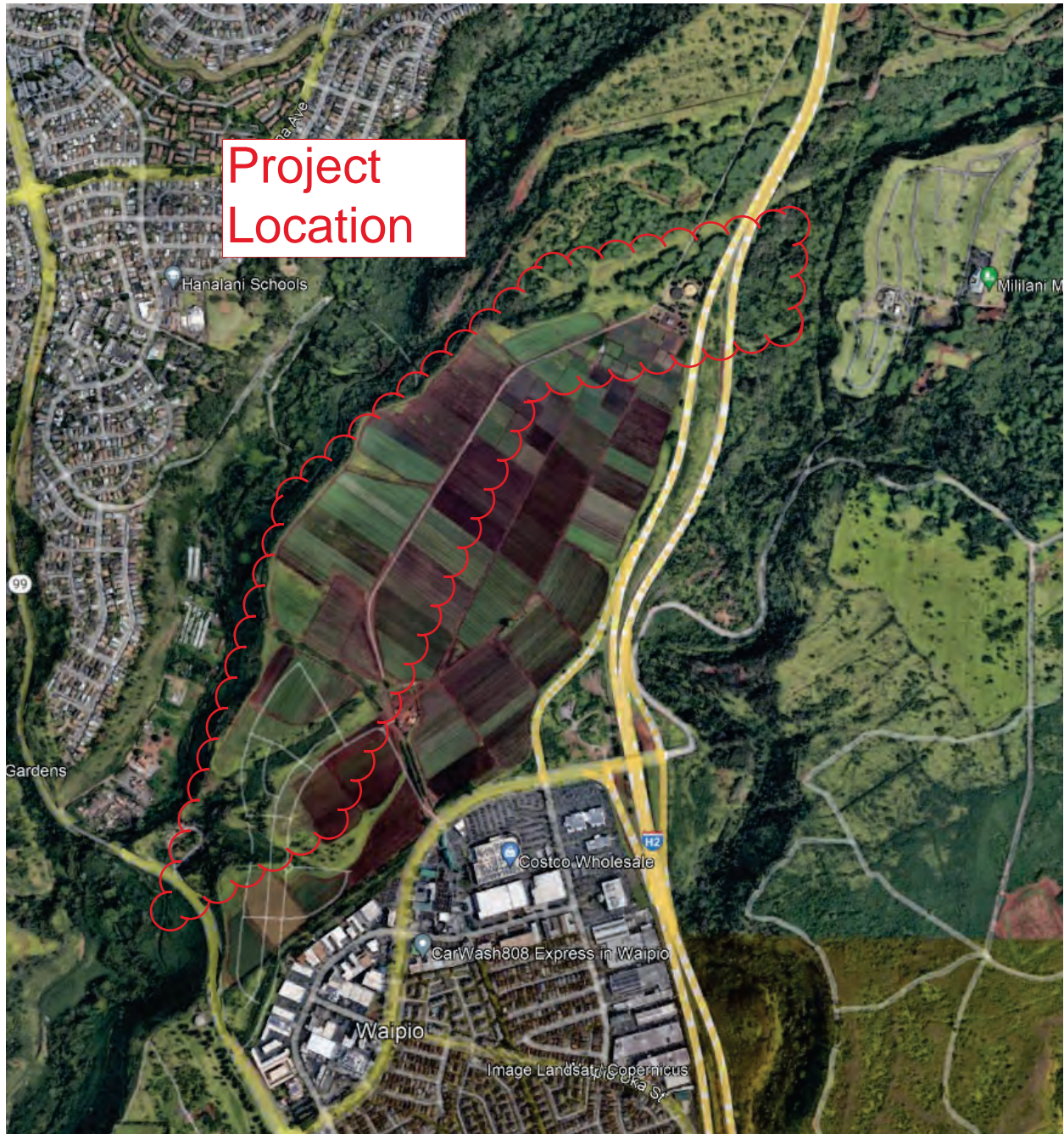
(4) grant Hawaiian Electric such other and further relief as may be just and equitable in the premises.

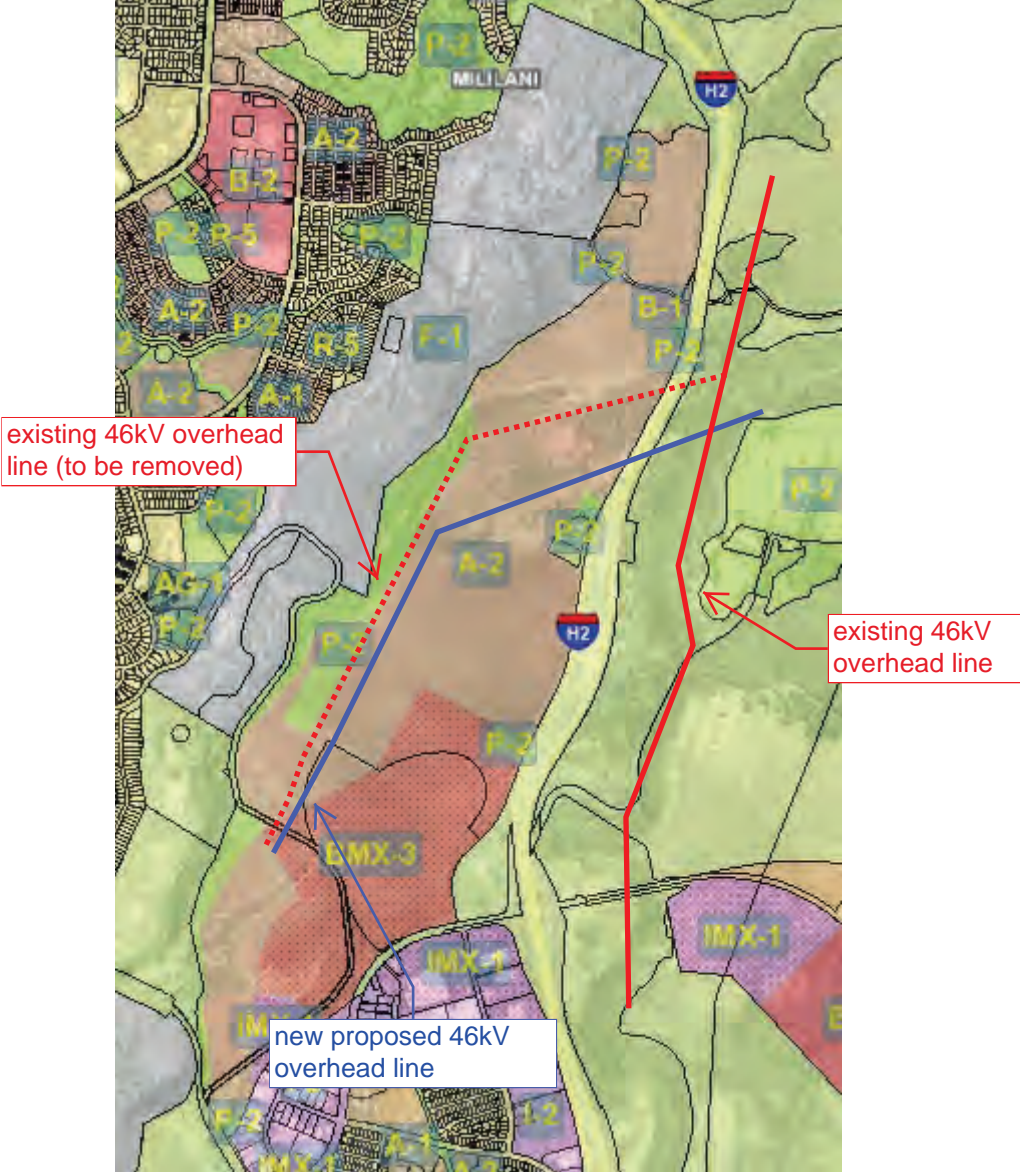
DATED: Honolulu, Hawai'i, July 11, 2022

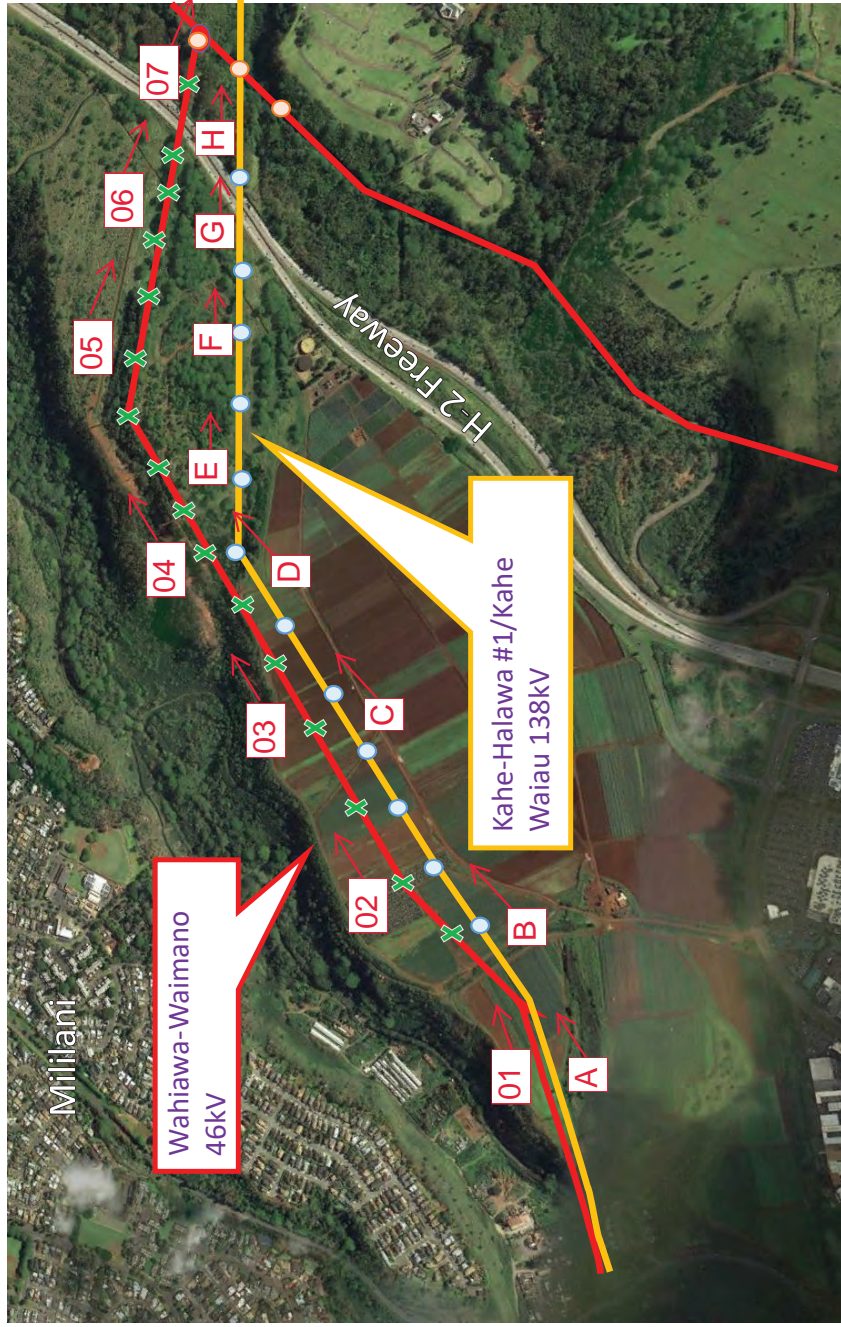
HAWAIIAN ELECTRIC COMPANY, INC.

By /s/ Tracie M.K. Black

Tracie M.K. Black
Associate General Counsel







- x Existing 46kV Pole to be removed
- o New 138kV/46kV pole
- o New 46kV pole

Exhibit III: Project Area Photographs

Existing 46kV overhead line









Existing 138kV Overhead Line









R/W 58-100C

OFFICE OF THE
ASSISTANT REGISTRAR, LAND COURT
STATE OF HAWAII

(Bureau of Conveyances)

Honolulu, Hawaii,.....

DEC 22 1961

283541

283542

The attached instrument is a true copy of Document Number.....
for registration in this office,....., at..... o'clock..... M., and
noted on Certificate.... of Title Number.....

Attest:—

Anthony C. ...

Assistant Registrar, Land Court,
State of Hawaii

And also recorded in the Bureau of Conveyances in
Liber 4184 Page 290

THIS INDENTURE made this 30th day of November, 1961, by and between DOLE CORPORATION, a Hawaii corporation (hereinafter called Grantor); THE HAWAIIAN ELECTRIC COMPANY, LIMITED, a Hawaii corporation, whose principal place of business and post office address is 900 Richards Street, Honolulu, City and County of Honolulu, State of Hawaii (hereinafter called Grantee), and OAHU SUGAR COMPANY, LIMITED, a Hawaii corporation (hereinafter called Lessee);

W I T N E S S E T H:

That the Grantor, in consideration of the sum of Ten Dollars (\$10) and other good and valuable consideration to it paid, the receipt whereof is hereby acknowledged, does hereby grant and convey unto the Grantee, its successors and assigns, a perpetual right and easement to build, construct, reconstruct, rebuild, repair, maintain and operate pole and wire lines and to use such poles, towers, wires, guys and other appliances and equipment as may be necessary for the transmission of electricity to be used for light and power and/or communications and control circuits, including the right to trim and keep trimmed any tree or trees in the way of said poles, towers, wires, guys and other appliances and equipment, and in the absence of public roadways giving reasonable access to the easement area, the right to use such private roads of the Grantor which may exist from time to time, and also the right to construct access roads over undeveloped lands of the Grantor, to reach said easement area and said poles and towers, it being understood that the location of any such access roads to be constructed by the Grantee shall be subject to mutual agreement of the Grantor and Grantee, for the construction, maintenance, repair and operation of said lines, in efficient use and condition over, across and through those certain premises situate at Waipio, Ewa, City and County of Honolulu, State of Hawaii, being Lot 1-A-22-G

(Map 22), Lots 85 and 86 (Map 35), Lots 108 and 110 (Map 37) and owned by the Grantor under Transfer Certificate of Title No. 83,936, and Lot 2 (Map 1) of Land Court Application 1790 (pending) being a portion of R. P. 4372, L. C. Aw. 7260, Apana 2, Part 5 to B, Namakeha, situate at Koalipea, Waikele, Ewa aforesaid, said easement area being one hundred (100) feet wide extending fifty (50) feet on either side of the center lines, all as shown on Map 58-100C of the Grantee hereto attached and by reference made a part hereof, including such designated portions of the adjoining lands beyond said 100-foot width as may be necessary for the proper location of guys and anchors, all of the foregoing areas being hereinafter referred to as the easement area.

RESERVING, HOWEVER, unto the Grantor, its lessees and tenants, full use of the land within the said right of way and easement except for the areas actually occupied by the towers, poles and equipment of the Grantee, such reserved right to be used in such manner as not to interfere with said lines, and no buildings or structures to be placed, erected or maintained by the Grantor, or the lessees or tenants of the Grantor, within the easement areas.

Term

TO HAVE AND TO HOLD the same unto the Grantee, its successors and assigns, forever, subject, however, to the condition that if Grantee shall abandon or cease to use said easement or any portion or portions thereof for a period of one year after the construction of Grantee's lines, then all rights granted hereunder shall cease and

determine as to the portion or portions of the easement so abandoned or not used, and upon the termination hereof or abandonment or nonuse as aforesaid, Grantee shall have the right to and will, if so requested, remove from said property at its own expense all its towers, poles, wires, guys, and other appliances and equipment, and will restore the ground to the like condition in which it was immediately before the installation of such towers, poles, wires, guys and other appliances and equipment.

AND THE GRANTEE does hereby covenant and agree:

Taxes

(1) That it will pay when and as the same become due all taxes and assessments levied and assessed against and upon said lines, including towers, poles, wires, guys, and appurtenances, and the easement hereby granted, whether assessed to or payable by either the Grantor or its tenants or the Grantee, but said covenant shall not require the payment of taxes or assessments levied against the land over which said easement passes;

Height of Wires

(2) That it will place and maintain the wires of said lines overhead only and so that the clearance of said wires above the surface of the ground will be in accordance with applicable rules and regulations to overhead construction of the Public Utilities Commission of the State of Hawaii, except that over agricultural land and roads said clearance shall be at a minimum of thirty-five (35) feet.

Covenant to Use Care and Diligence

(3) That it will use due care and diligence in the construction and operation of said lines and appurtenances and in the exercise of its rights hereunder and will also and at all times exercise its rights hereunder

in such manner as will cause the least possible interference with the use of the easement area by the owner, lessees and occupants thereof and will not occasion any unnecessary damage or injury to the premises or to any lessees, agents, servants or employees of the Grantor;

Reimbursement for Damages

(4) That it will reimburse the Grantor, its tenants and any other permitted occupants of the Grantor's lands for any and all damage or injury to their crops and other property caused by, sustained or resulting from the construction or maintenance of said lines and appurtenances or other exercise of its rights hereunder;

Indemnity Clause

(5) That it will indemnify and hold harmless the Grantor and all persons occupying said easement area or land immediately adjacent thereto, either under lease from or by permission of the Grantor, from any and all claims and demands against them for loss of or damage to property or injury or death to persons, including the claims of the Grantor's agents and servants, caused by or resulting from or arising out of the construction, maintenance, operation or removal of said lines and appurtenances and/or the exercise of any of the Grantee's rights hereunder, provided such loss, damage, injuries or death is not caused by the negligence of the party or parties to be indemnified or their agents or servants acting within the course and scope of their employment, and from and against all damages, costs, counsel fees, expenses and liabilities incurred in or resulting from any such claim or demand or any action or proceeding brought thereon;

Assignment Clause

(6) That it will not assign, sublet or mortgage

this easement, nor part with the possession or control of the easement area or any portion or portions thereof, without the previous written consent of the Grantor; PROVIDED, HOWEVER, that the same may be assigned, without such consent, to Hawaiian Trust Company, Limited, Trustee for the bondholders of the Grantee, and such Trustee may, without such consent, assign the same to a purchaser upon foreclosure;

Restoration
of Surface

(7) That after any construction, repair or removal of the above described lines and equipment, the Grantee will restore the surface of the easement area as nearly as is reasonably possible to its condition immediately prior thereto;

Abandonment
or Termination

(8) In the event of abandonment or termination or cessation of this easement with respect to all of the easement area or any portion or portions thereof, the Grantee will prepare, execute and record an appropriate instrument or instruments terminating its interest hereunder and removing the cloud on title caused by this indenture with respect to all or such portion or portions of said easement area affected by such abandonment, termination or cessation; it being understood that any such abandonment, termination, or cessation will not affect or release any liability of the Grantee at such time existing by reason of breach of any of the terms hereof;

Designation
on Land
Court Map

(9) That at any time, upon the written request of the Grantor, its successors or assigns, the Grantee, at its sole cost and expense and without any cost or expense to the Grantor, its successors or assigns, shall cause the easement area to be designated on a map duly

approved by and filed with the Land Court of The State of Hawaii, and further, that at such time as the Grantor's lands adjoining said easement area are developed and subdivision roadways created giving reasonable access to the easement area, the Grantee's easement to use existing and future roads and to construct extensions to roads shall be cancelled by appropriate instrument insofar as said easement pertains to the areas served by said subdivision roadways.

AND IT IS HEREBY MUTUALLY AGREED:

Condemnation
Clause

(1) That if at any time the premises across which a right or easement is hereby granted, or any part thereof, shall be taken or condemned by any authority having the power of eminent domain, then and in every such case all compensation and damages payable for or on account of such premises and any adjoining property of the Grantor, including any part of said easement so taken or condemned, shall be paid to and be the property of the Grantor without any apportionment thereof to the Grantee, provided that the Grantee shall be entitled to recover only from the condemning authority full compensation for its lines, poles, towers, anchors, appliances, equipment and appurtenances and any severance damages to its right of way, including the cost of obtaining and relocating to a substitute right of way.

Definitions

(2) That the term "Grantor" in these presents shall include the Grantor, its successors and assigns and all subsequent owners of the easement area or portion or portions thereof, and the term "Grantee" shall include the Grantee and its successors and assigns, and that this instrument shall be binding upon and shall inure to the

benefit of the parties hereto and their respective successors and assigns.

Lessee's
Consent

AND the Lessee, Oahu Sugar Company, Limited, in consideration of the sum of One Dollar (\$1.00) to it paid by the Grantee, the receipt whereof is hereby acknowledged, does hereby join in and confirm the foregoing grant to the extent of its leasehold interests in all the lands hereinabove mentioned (by lease dated December 28, 1951 expiring March 31, 1982) and consents to the construction and maintenance of said power lines upon the terms and conditions hereinabove set forth, and agrees that its leasehold interests shall be subject thereto.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be duly executed the day and year first above written.

DOLE CORPORATION

By *J. M. Cannon*
Its VICE-PRESIDENT

By *A. J. Little*
Its SECRETARY

Grantor

THE HAWAIIAN ELECTRIC COMPANY,
LIMITED

By *George Hoag*
Its VICE-PRESIDENT

By *L. L. Summers*
Its SECRETARY

Grantee

As witness to
Signature *agu*
Capacity *D.C.*

APPROVED	
AS TO	
Form:	FRATT, MOORE, PATTI & WITOUSEK
By:	<u><i>W. H. Moore</i></u>
Agency, and or Description:	<u><i>D. Zane</i></u>
Terms:	<u><i>As per contract</i></u>
Project:	C. H. WILLIAMS

OAHU SUGAR COMPANY, LIMITED

By J. E. Ednie
Its J. E. Ednie VICE PRESIDENT

JEF

By James T. Witten
Its James T. Witten ASSISTANT SECRETARY

Lessee

CORPORATION

STATE OF HAWAII, }
City and County of Honolulu } ss.

On this 14th day of December, A. D. 1961, before me appeared
J. E. Ednie and James T. Witten
to me personally known, who, being by me duly sworn, did say that they are the
Vice President and Assistant Secretary
respectively of Oahu Sugar Company, Limited
and that the seal affixed to the foregoing instrument is the corporate seal of said
corporation and that said instrument was signed and sealed in behalf of said corpora-
tion by authority of its Board of Directors, and the said J. E. Ednie
and James T. Witten acknowledged said instrument to be the
free act and deed of said corporation.

Robert S. Williams
Notary Public, First Judicial Circuit,
State of Hawaii.

My Commission Expires August 20, 1962

CORPORATION

STATE OF HAWAII, }
City and County of Honolulu } ss.

On this 18th day of December, A. D. 1961, before me appeared
GEORGE HOGG and R. L. SUMMERS
to me personally known, who, being by me duly sworn, did say that they are the
Vice President and Secretary
respectively of THE HAWAIIAN ELECTRIC COMPANY, LIMITED
and that the seal affixed to the foregoing instrument is the corporate seal of said
corporation and that said instrument was signed and sealed in behalf of said corpora-
tion by authority of its Board of Directors, and the said
George Hogg and R. L. Summers acknowledged said instrument to be the
free act and deed of said corporation.

James V. Murray
Notary Public, First Judicial Circuit,
State of Hawaii.

My commission expires 6-30-65



KNOW ALL MEN BY THESE PRESENTS:

That in order to comply with Section 196-4 of the Revised Laws of Hawaii 1955, and to further secure and comply with the after-acquired property clause in that certain First Mortgage and Deed of Trust, executed on December 1, 1938, on file in the Office of the Assistant Registrar of the Land Court of Hawaii as Document No. 45945, and recorded in the Bureau of Conveyances of Hawaii in Liber 1473, at page 55, as the same has been and may hereafter be amended, hereinafter referred to as the trust mortgage, which trust mortgage was completely revised by agreement dated as of March 27, 1944, on file as Document No. 72820, and recorded in said Bureau of Conveyances in Liber 1821, at page 113, and which trust mortgage was last amended by agreement dated November 22, 1960, on file as Document No. 266234, and recorded in said Bureau of Conveyances in Liber 3958, at page 285, The Hawaiian Electric Company, Limited, mortgagor in said trust mortgage, and Grantee in the Grant to which this instrument is attached, does hereby grant, bargain, sell, convey, transfer, assign, mortgage, confirm, warrant, set over and deliver unto Hawaiian Trust Company, Limited, a Hawaii corporation having its principal office and place of business at 1010 Richards Street, Honolulu, Hawaii, the Trustee named in said trust mortgage, as such Trustee under said trust mortgage, as amended and its successors in trust and assigns, all of its right, title and interest in and to said document to which this instrument is attached.

To Have and To Hold the same, together with all rights, easements, privileges and appurtenances thereunto or to any part thereof belonging or appertaining, unto the said Trustee and its successors in trust and assigns;

In Trust, Nevertheless, under the trusts and subject to the conditions and provisions, including the defeasance clause, set forth in the trust mortgage, as amended, and as the same may from time to time hereafter be amended.

IN WITNESS WHEREOF, said The Hawaiian Electric Company, Limited has caused these presents to be executed in its corporate name by its proper officers and its corporate seal to be hereunto affixed, all at Honolulu, Hawaii, the 18th day of December, 1961.

THE HAWAIIAN ELECTRIC COMPANY, LIMITED

By George Hogg
Its VICE PRESIDENT
By R. L. Summers
Its SECRETARY

STATE OF HAWAII }
City and County of Honolulu } 55

On this 18th day of December, 1961, before me appeared GEORGE HOGG and R. L. SUMMERS to me personally known, who being by me duly sworn, did say that they are the Vice President and Secretary respectively of The Hawaiian Electric Company, Limited, and that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and the said George Hogg and R. L. Summers acknowledged said instrument to be the free act and deed of said corporation.

Annie V. Murray
Notary Public, First Judicial Circuit,
State of Hawaii

My commission expires 6-30-65

3 of 8

SPECIAL EASEMENT STUDY FORM

Right of Way No. 1958-100C Project Name Waiapu Wahiawa 138KV
 .MK No. 9-4-003:002 Location WAIPIO, EWA, OAHU, HAWAII
 Vegetation Management Line Segment No. KAH3 EAST Segment Name KUNIA - MILILANI - MANANA
 Grantor DOLE CORPORATION Joint Ownership Y / (N)
 Current Owner Castle & Cooke Inc. Waiapu & Koalipea EWA

DOCUMENT:

Date: NOV. 30, 1961 Standard Terms & Conditions Y / (N) Due Diligence, Indemnification & Condemnation ONLY
 Type: Grant / Lease / License / Right of Entry / Permit / Letter Agmt / Cancellation / Partial Canc. /
 Amdt to GOE / Indemnity Agmt / Encroachment Agmt / Other
 Legal Description: Liber 4186 Page 200 Document No. 283541
 Date Recorded DEC 22, 1961 TCT No. 83936
 Term: Perpetual (Yes) / No
 Lease Term — Years Effective —
 Expiration —
 Continues on Mo. to Mo. from — Yr. to Yr. from —
 Advanced Notice for Termination — days
 Rent: \$ — per (Mo, Qrt, Yr, —)
 Consideration \$ 10.00 One-time or 1st Period eff — to —
 \$ — 2nd period effective — to —
 \$ — 3rd period effective — to —
 Condemnation Y / (N) Threatened (not filed) Y / (N) Condemnation (Civil #) N/A

SPECIAL CONDITIONS: (Attach copy of document if special conditions exist in document)

A) Preservation of Historic &/or Archaeological Sites: Y / (N)
 Easement Size: Width 100 feet Area — sf / ac
 B) Encroachment: Y / (N) (Allowable improvements in easement)
 C) Environmental Asmt: Y / (N) (Is an EA required?) (When?) —
 D) Height Limit: (Y) / N GO # — or 35 ft / in (Minimum height requirement)
 E) Insurance: General Liability \$ — / \$ — (Minimum/Aggregate)
 Property Damage \$ — / \$ — (Minimum/Aggregate)
 F) Notifications: Y / (N) Is notification to enter or work required prior to entry?
 If notification is required, who is the contact? —
 Phone —
 G) Relocation: Is relocation required? Y / (N) # Times — (One-time, twice, unlimited)
 Exercised Y / (N) (Has line been relocated?) — R/W Doc #
 Responsible Party — (Who is responsible for relocation cost?)

OTHER SPECIAL RESTRICTIONS:

H) Herbicide Use Y / (N) J) Gate Locking Y / (N) L) Y / N
 I) Cutting Trees Y / (N) K) Landscaping Y / (N) L) Y / N

ADDITIONAL TMKS: 9-4-005:048
9-4-006:002

COMMENTS:

Castle & Cooke
Homes Hawaii, Inc.

August 2, 2019

Ms. Nicole Lee
Hawaiian Electric Company, Inc.
PO Box 2750
Honolulu, Hawaii 96803-9989

Dear Ms. Nicole Lee:

Subject: Request Removal of Overhead Line B 46kv & 12KV to Underground

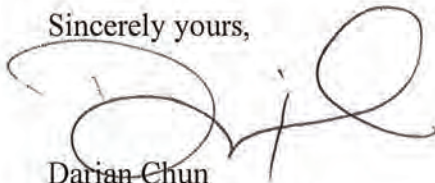
Please let this letter serve as a request by Castle & Cooke Homes Hawaii, Inc. ("Castle"), the present owner of the lands affected by overhead electrical transmission Line B, to relocate such electrical transmission line. The overhead electrical transmission Line B to be relocated is shown in red on the attached Exhibit 1.

In order to relocate the services of Line A & B, we need to construct Road U of our project Road T, U, & B. However, we understand that the relocation of Line B may not occur in time of the start construction of the Road T, U, & B. Therefore, we ask to expedite the relocation of pole 17 sooner than the relocation of Line B. Attached is a plan (Exhibit 2) that shows the conflict of the pole with the installation of the utilities in the Road U (as shown in the red clouded area) and a suggestion to temporarily relocate the pole. This temporary relocation of the pole would need to occur prior to the first quarter of 2020 in order for us to maintain our development schedule of the surrounding parcels.

Castle is requesting for these relocations to be at the expense of the HECO since this line does not have a grant of easement.

Please feel free to call me if you need more information at 548-2904 or email me at dchun@castlecooke.com.

Sincerely yours,



Darian Chun
Senior Site Engineer

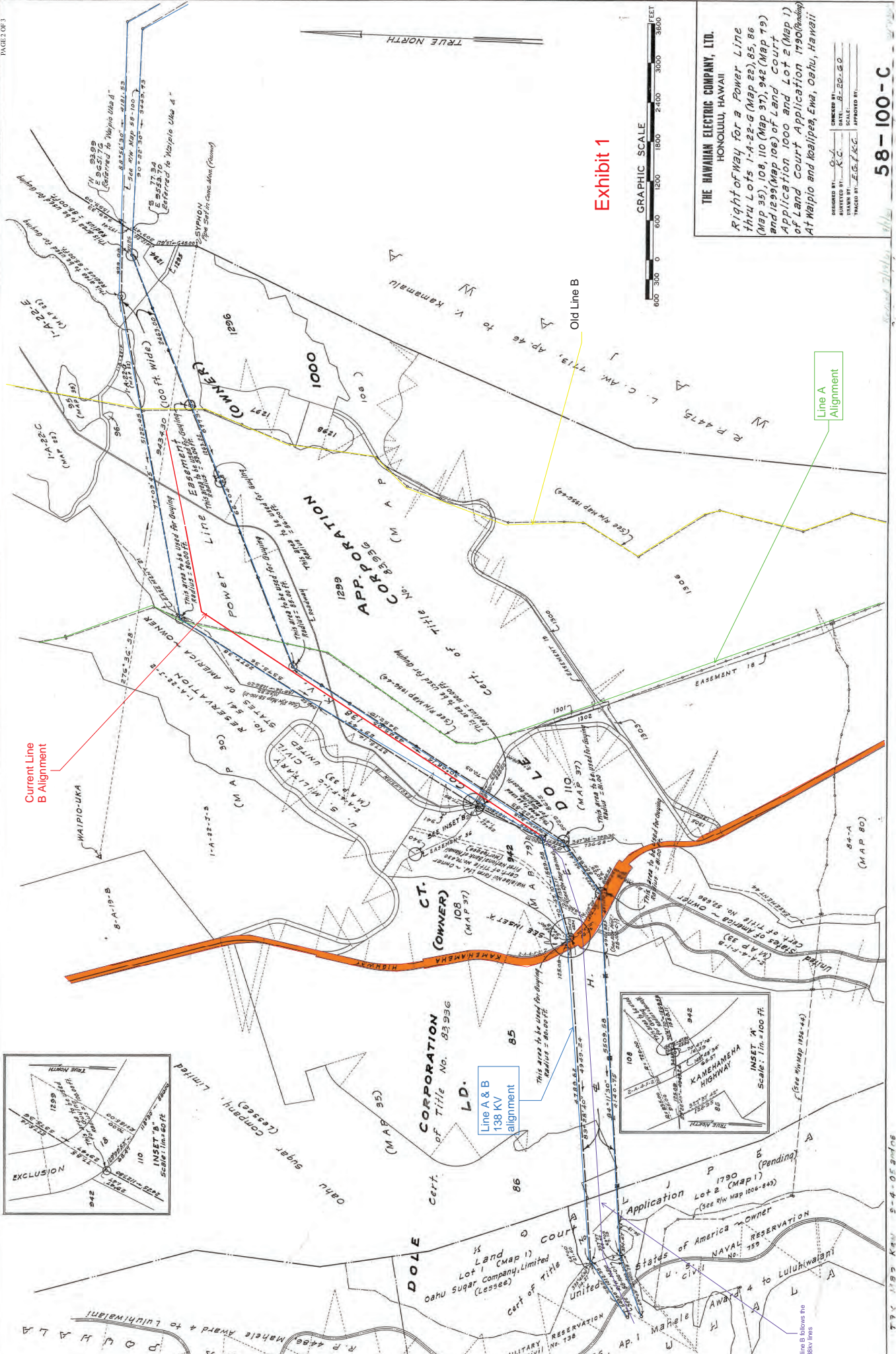


Exhibit 1

THE HAWAIIAN ELECTRIC COMPANY, LTD.
HONOLULU, HAWAII

Right of Way for a Power Line thru Lots 1-A-22-G (Map 22), 85, 86 (Map 35), 108, 110 (Map 97), 942 (Map 79) and 1295 (Map 106) of Land Court Application 1000 and Lot 2 (Map 1) of Land Court Application 1790 (pending) at Waipio and Keali'ope, Ewa, Oahu, Hawaii

DESIGNED BY: G.J. K.C.
DRAWN BY: K.C.
CHECKED BY: E.G.J.K.C.
APPROVED BY: _____

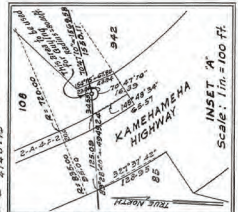
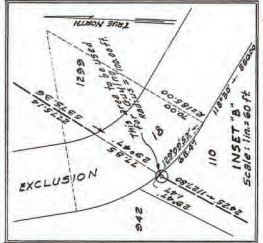
SCALE: 1" = 200'-0"

58-100-C

Current Line B Alignment

Line A Alignment

Line A & B
138 KV
alignment

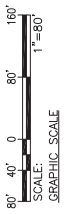


774 1295 KEU 5-4-06/916



RELOCATE HECO 46KV OVERHEAD LINE B (ROAD U)

SCALE: 1" = 80'



EXIST. HECO
POLE P.18

Existing pole conflicts
sewer line installation.

EXIST. HECO
POLE P.17 TO
BE REMOVED
BY HECO
(OCT 2019)

HECO POLE P.17
TO BE
REMOVED
BY HECO
(OCT 2019)

OFFSET 30.24 FT

EXIST. HECO
POLE #67

EXIST. HECO POLE
#2/309A

PARCEL A3

ROAD "U"

PARCEL M2

PARCEL A1

ZONING A-2

EXIST. HECO
POLE P.313

EXIST. HECO
POLE P.312

EXIST. HECO
POLE P.311

EXIST. HECO
POLE #1/309A

EXIST. HECO
POLE P.310

EXIST. UTILITY POLE

EXIST. HECO POLE P.309A

FUTURE PARK SITE

EXIST. HECO TO
POLE P.16 TO
BE RELOCATED
BY HECO

HECO POLE P.16

FUTURE CHURCH SITE

EXIST. HECO
POLE #66

EXIST. HECO POLE
#3/309A

ROAD "B"

ZONING A-2

ZONING BMX-3

ROAD "A"

ROAD "C"

ZONING BMX-3



June 21, 2022

Mr. Darian Chun
Director of Site Development
Engineering & Site Construction
CASTLE & COOKE HOMES HAWAII, INC.
680 IWILEI ROAD, SUITE 510
HONOLULU, HAWAII 96817

RE: Easement Offer 46kV Line B – Koa Ridge

Dear Mr. Chun:

As you are aware Hawaiian Electric Company, Inc., (“Hawaiian Electric”) operates an overhead 46kV line in the Koa Ridge development which does not have an easement. The overhead line is critical to our existing electrical system. Therefore, Hawaiian Electric is respectfully requesting your assistance in granting an easement for our existing facilities. Hawaiian Electric hired an independent appraiser to determine the value of the easement. The requested easement is 52.5’ wide by 9,000 linear feet equaling 472,500square feet. Based on the results of the appraisal, Hawaiian Electric offers compensation in the amount of [REDACTED] for the easement shown on the attachment.

If this offer is acceptable, please affirm Castle & Cooke Homes Hawaii, Inc.’s acceptance by executing this letter in the “Acknowledged and Accepted” space provided below. Once the letter is signed, please return it to the following address:

Land & Rights of Way
Hawaiian Electric Company, Inc.
Attn: Wendy Oda
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Upon receipt of the countersigned letter, Hawaiian Electric will proceed with drafting the formal grant of easement document. Once the grant of easement document has been signed and recorded, Hawaiian Electric will mail Castle & Cooke Homes Hawaii, Inc. a copy of the recorded document and a check in the amount of [REDACTED] representing the agreed upon easement compensation.

As stated, this easement is critical for Hawaiian Electric’s electric system, allowing Hawaiian Electric to continue providing reliable electrical service to O’ahu. If the parties are unable to reach an agreement on the acquisition of this easement,



Hawaiian Electric may be compelled to acquire the easement via condemnation proceedings.

If have any questions, or require any additional information, please feel free to contact me at 543-4735, or at wendy.oda@hawaiianelectric.com. We appreciate your attention to this matter.

Sincerely yours,

Wendy Oda

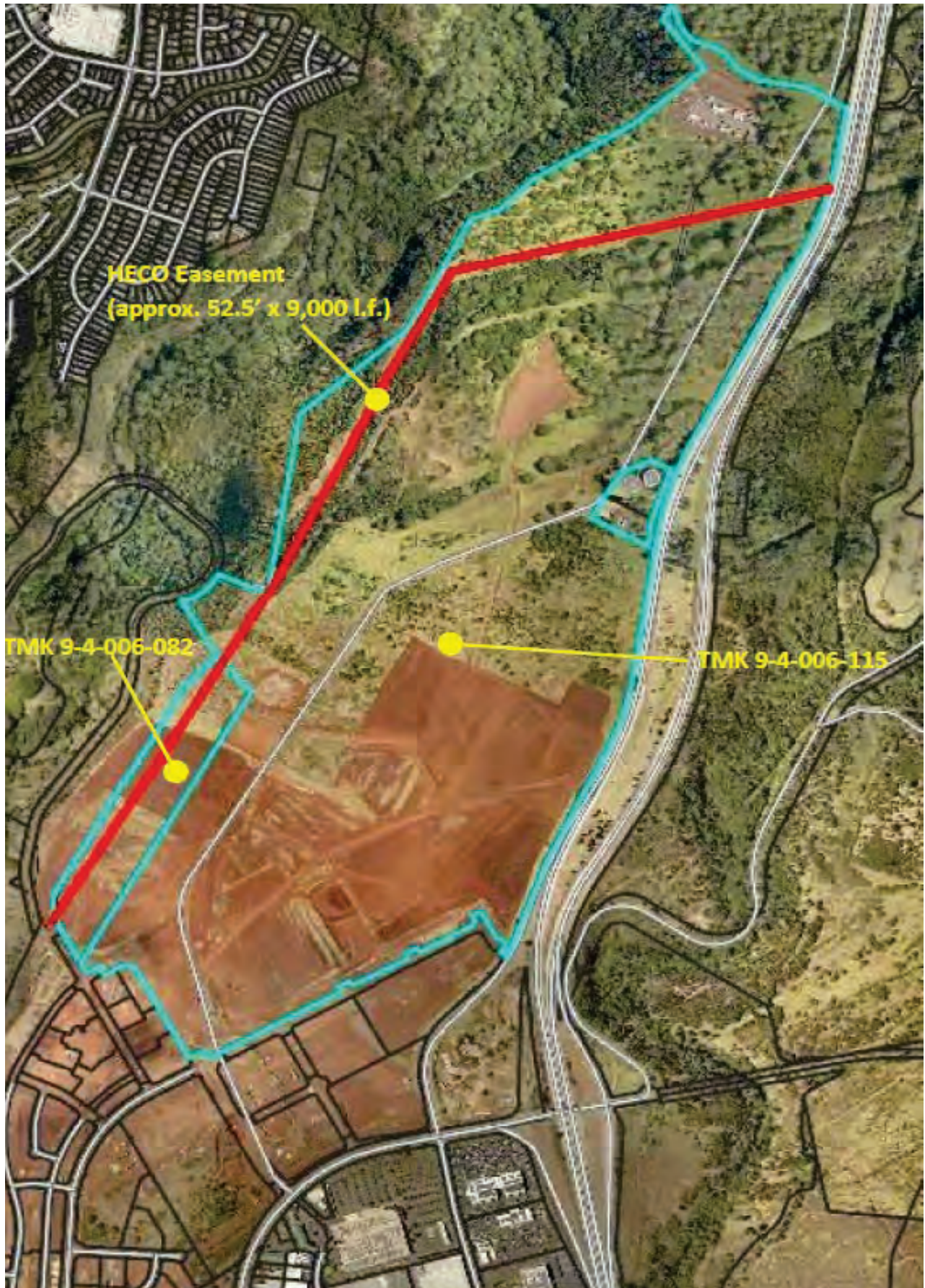
Wendy E. Oda
Land & Rights of Way

Acknowledged and Accepted:
Castle & Cooke Homes Hawaii Inc.

By _____
Name:
Its:

Date: _____

Attachment





June 28, 2022

Wendy Oda
Land & Rights of Way
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Ms. Wendy Oda:

Subject: Response to Easement Offer 46KV Line B Relocation dated June 21, 2022

We have received HECO's request and offer for a grant of easement for Line B to remain in its current location. However, we are not able to accept this offer since the easement area is within a future park area that will be dedicated to the City as a public community park to meet our Land Use Ordinance (LUO).

The LUO requires a specific amount of useable park space for each house that is constructed. This overhead line is within the calculated usable park space that we need to meet our requirements. The line dissects the open area in a way that renders the area unusable.

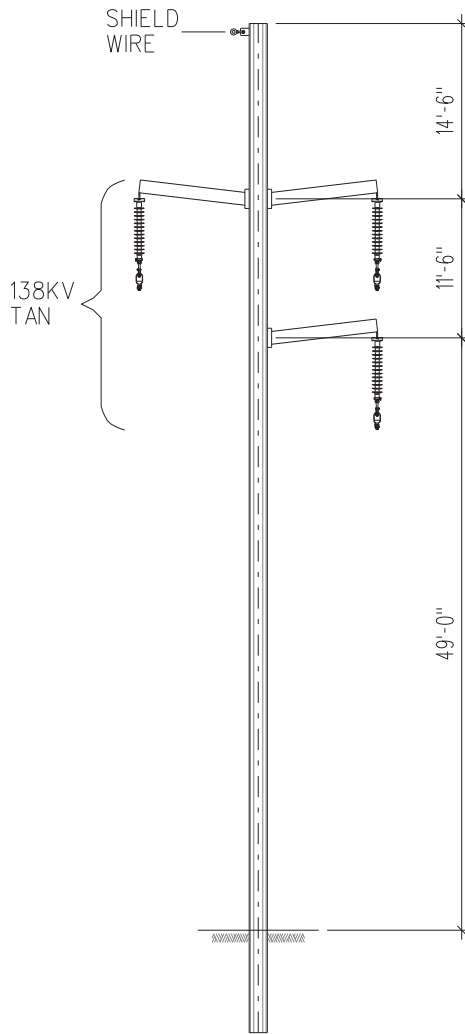
The City has agreed to accept the dedication of this park and its location. Our approvals of this submittal to the City did not include the overhead power line or a future easement for any overhead lines.

We appreciate the offer, but due to our requirements cannot accept this offer.

Sincerely yours,

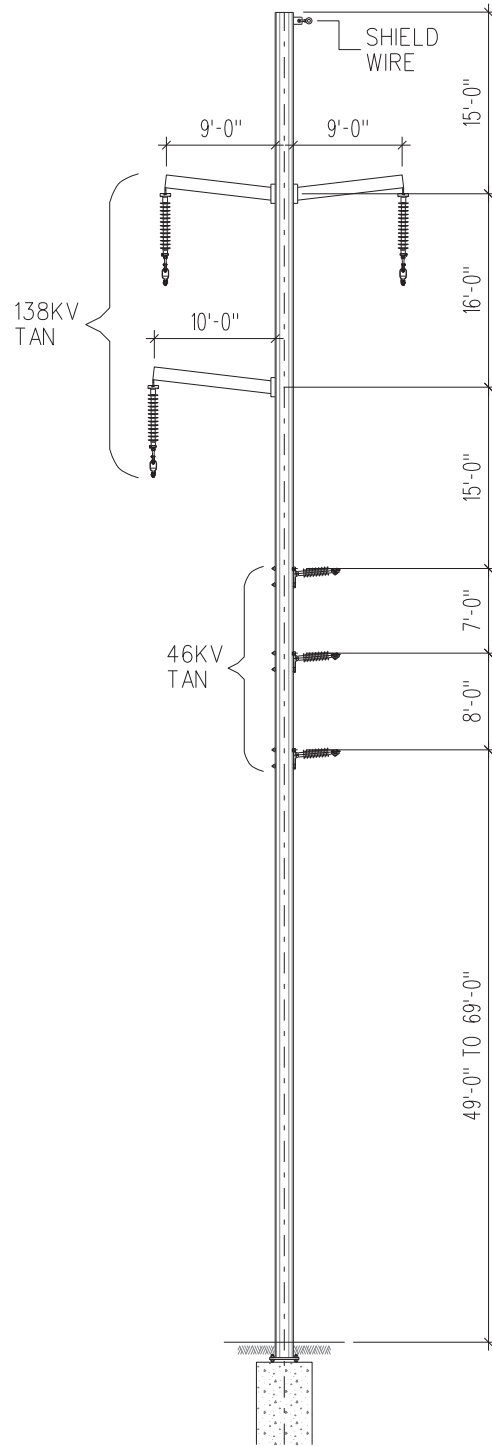
A handwritten signature in blue ink, appearing to be "Darian Chun", is written over a light blue circular scribble.

Darian Chun
Director of Site Development



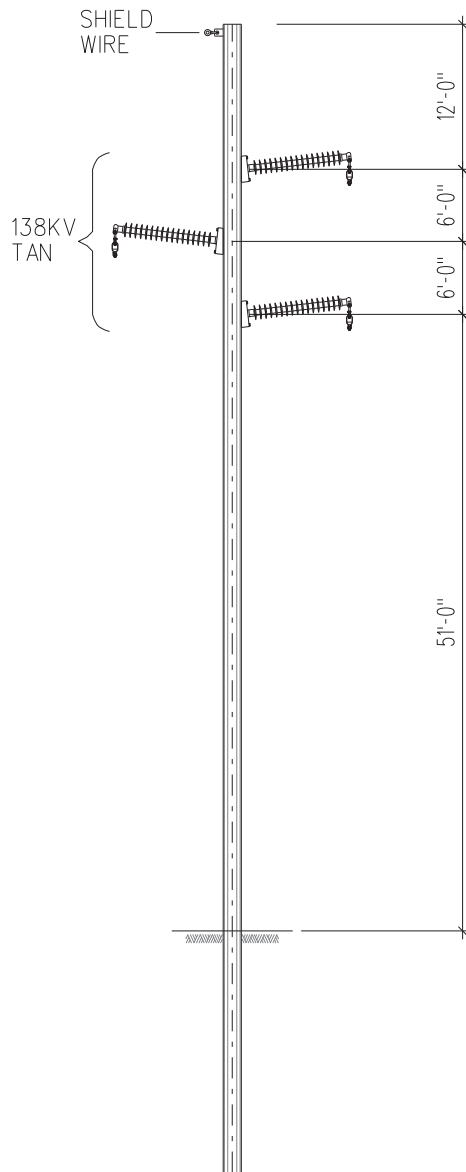
**STR 67 - STR 61
EXISTING CONFIGURATION**

75' AGH KAHE-HALAWA 1
TANGENT STRUCTURES



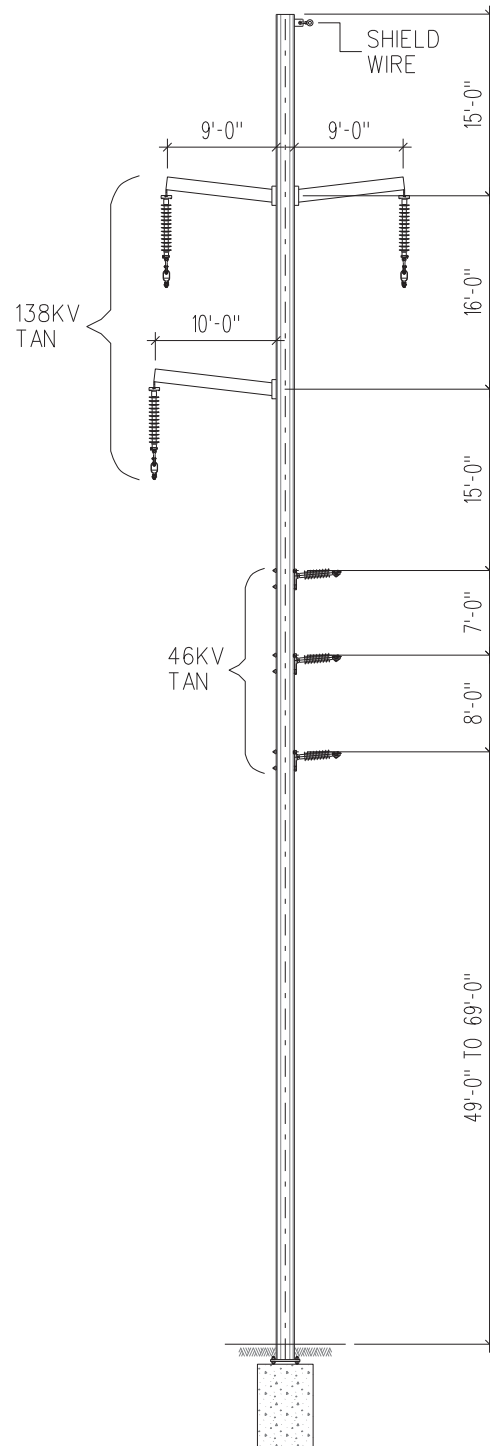
**STR 67 - STR 61
PERMANENT CONFIGURATION**

110' TO 130' AGH KAHE-HALAWA 1
TANGENT STRUCTURES



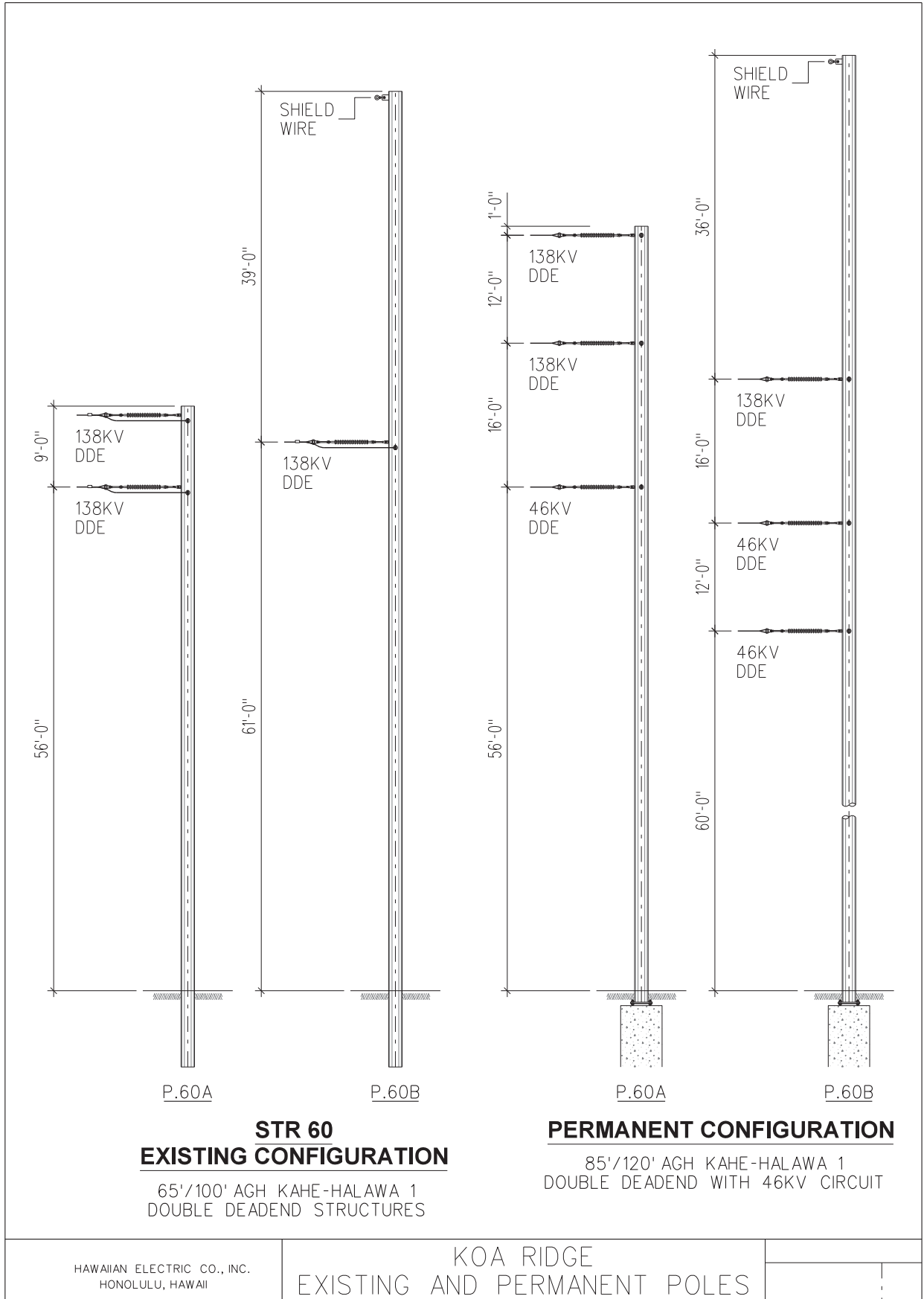
STR 59 - STR 56A
EXISTING CONFIGURATION

75' AGH KAHE-HALAWA 1
TANGENT STRUCTURES



STR 59 - STR 56A
PERMANENT CONFIGURATION

110' TO 130' AGH KAHE-HALAWA 1
TANGENT STRUCTURES





BE/G

June

Mr. Darian Chun
Senior Site Engineer
Castle & Cooke Homes Hawaii Inc
68 I ilei Road Suite 5
Honolulu Hawaii 968

Dear Mr. Chun

**Subject: Koa Ridge – 46kV Line B Relocation
Query for the Cost to Underground**

In accordance with Hawaii Revised Statutes § 69.06(a)(3) Hawaiian Electric Company Inc. (HECO) is requesting whether government agencies or other parties are willing to pay for the additional costs of undergrounding the electric lines for the subject project.


This project involves the relocation of the Wahia-a-Waimano 46kV circuit. The lines will be relocated out of the proposed Koa Ridge development in Waipio Oahu as indicated on the attached drawing. The scope of work involves the replacement of sixteen (6) existing poles and the installation of sixteen (6) new poles and approximately .3 miles of sub transmission lines.

The estimated cost for the 46kV overhead line relocation is \$5,845,845. The estimated cost for a 46kV underground alternative is \$9,399,999. The underground route follows the proposed Road B in the Koa Ridge Development. **Please notify Hawaiian Electric by July 18, 2022** if Castle & Cooke is interested in paying the additional costs of undergrounding these 46kV lines.

Thank you for your attention on this matter. Pamela Toshi is the engineer assigned to this project. If you have any questions please call her at 543-4463.

Sincerely

Okamura,
Dave

 Digitally signed by
Okamura, Dave
Date: 2022.06.22
16:59:57 -10'00'

Dave Okamura
Director
Engineering

bcc: P. Toshi/M. Hoopii/M. Lum (WA3-BE)



BE/G

June

Mr. Dean Uchida
Director Department of Planning and Permitting
City & County of Honolulu
65 South King Street 7th Floor
Honolulu Hawaii 96813

Dear Mr. Uchida

**Subject: Koa Ridge – 46kV Line B Relocation
Query for the Cost to Underground**

In accordance with Hawaii Revised Statutes § 69-7.6(a)(3) Hawaiian Electric Company Inc. (HECO) is requesting whether government agencies or other parties are willing to pay for the additional costs of undergrounding the electric lines for the subject project.

This project involves the relocation of the Wahiawa-Waimano 6kV circuit. The lines will be relocated out of the proposed Koa Ridge development in Waipio Oahu as indicated on the attached drawing. The scope of work involves the replacement of sixteen (16) existing poles and the installation of sixteen (16) new poles and approximately 1.3 miles of sub transmission lines.

The estimated cost for the 6kV overhead line relocation is \$5,181,558. The estimated cost for a 6kV underground alternative is \$9,379,901. The underground route follows the proposed Road B in the Koa Ridge Development. **Please notify Hawaiian Electric by July 18, 2022** if the City and County of Honolulu is interested in paying the additional costs of undergrounding these 6kV lines.

Thank you for your attention on this matter. Pamela Toshi is the engineer assigned to this project. If you have any questions please call her at 531-6300.

Sincerely,

Okamura,
Dave

Digitally signed by
Okamura, Dave
Date: 2022.06.24
10:26:46 -10'00'

Dave Okamura
Director
Engineering

cc (email): Darian Chun (Castle & Cooke)

bcc: P. Toshi/ M. Hoopii/ M. Lum (WA3-BE)

From: [Uchida, Dean](#)
To: [Toshi, Pamela](#)
Cc: [Takeuchi Apuna, Dawn](#); [Rodriguez, Yazmyn](#); [Laura Kodama \(lkodama@castlecooke.com\)](mailto:Laura.Kodama@castlecooke.com)
Subject: RE: [Koa Ridge 46kV Line B Relocation] Query for the Cost to Underground (HRS 269-27.6)
Date: Thursday, July 7, 2022 2:48:06 PM

[This email is coming from an EXTERNAL source. Please use caution when opening attachments or links in suspicious email.]

Ms. Toshi,

The City and County of Honolulu is not interested in paying the additional cost for this project.

Thanks, dean

From: Toshi, Pamela <pamela.toshi@hawaiianelectric.com>
Sent: Thursday, July 7, 2022 9:29 AM
To: Uchida, Dean <dean.uchida@honolulu.gov>
Subject: [Koa Ridge 46kV Line B Relocation] Query for the Cost to Underground (HRS 269-27.6)

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Hi Dean,

I'm with Engineering in Hawaiian Electric and I wanted to know if you received the letter we mailed out last week for the Koa Ridge Line B Relocation project, per HRS 269-27.6. I have attached the letter for your reference, which includes the scope of work. We will be including this letter and your formal response in the PUC application for this project, and we wanted to know when you would be able to provide a response as we plan to file soon.

Please let me know if you have any questions or concerns.

Thanks,

PAMELA TOSHI

Transmission & Distribution, Engineering
Hawaiian Electric

W: (808) 543-4463

C: (808) 699-5833

pamela.toshi@hawaiianelectric.com

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the



BE/G

June

Mr. Jade Butay
State of Hawaii
Director Department of Transportation
AliiAIMoku Building
869 Punchbowl Street Room 509
Honolulu Hawaii 96813

Dear Mr. Butay

**Subject: Koa Ridge – 46kV Line B Relocation
Query for the Cost to Underground**

In accordance with Hawaii Revised Statutes § 69-16(a)(3) Hawaiian Electric Company Inc. (HECO) is requesting whether government agencies or other parties are willing to pay for the additional cost of undergrounding the electric line for the subject project.


This project involves the relocation of the Wahiawa-Waimano 46kV circuit. The line will be relocated out of the proposed Koa Ridge development in Waipio Oahu as indicated on the attached drawing. The scope of work involves the replacement of sixteen (16) existing poles and the installation of sixteen (16) new poles and approximately .3 mile of subtransmission line.

The estimated cost for the 46kV overhead line relocation is \$5,845,845. The estimated cost for a 46kV underground alternative is \$9,399,999. The underground route follows the proposed Road B in the Koa Ridge Development. **Please notify Hawaiian Electric by July 18, 2022** if the State of Hawaii Department of Transportation is interested in paying the additional cost of undergrounding the 46kV line.

Thank you for your attention on this matter. Pamela Tohi is the engineer assigned to this project. If you have any questions please call her at 543-4463.

Sincerely

Okamura,
Dave

 Digitally signed by
Okamura, Dave
Date: 2022.06.22
16:59:26 -10'00'

Dave Okamura
Director
Engineering

cc (email): Darian Chun (Cattle & Cooke)

bcc: P. Tohi/M. Hoopii/M. Lum (WA3-BE)

**46kV COST COMPARISON
OVERHEAD vs. UNDERGROUND ALTERNATIVES**

The overhead line alternative involves the relocation of a section of 46kV line to underbuild on new 138kV structures.

The underground line alternative involves the construction of a section of new 46kV underground line. The 46kV line would need a total of 4 poles to be installed—two riser poles on either side of the freeway to cross the road overhead, and two riser poles on either end of the relocated line to transition the new underground line to the existing overhead line.

	OH Estimate	UG Estimate
Engineering	\$ 394,902	\$ 451,362
Material	\$ 1,870,737	\$ 7,079,925
Construction	\$ 1,952,183	\$ 1,552,227
AFUDC	\$ 91,995	\$ 94,923
TOTAL (Capital)	\$ 4,309,817	\$ 9,178,437
Removals	\$ 871,641	\$ 201,464
Total Project Cost	\$ 5,181,458	\$ 9,379,901

Note: Does not include General Excise Tax (GET)

OVERHEAD Line Item costing more than \$1,000:

Overhead Costs

18	46kV Vertical Post Insulator Framing	\$ 14,807
8	46kV Vertical Susp DE Framing	\$ 6,220
28,067	Conductor, Bare 336.4 KCM AL	\$ 23,015
8	Steel Poles P60-P67	\$ 1,250,000
4	Steel Poles P56A-P59	\$ 1,375,000

UNDERGROUND Line Item costing more than \$1,000:

Overhead Costs

2	Wood Pole, 70 ft, Class 1	\$	5,425
2	Steel Pole, 75 ft, 3-10 Deg	\$	47,381
4	46kV DE Riser	\$	28,050
8	½" Anchor Guy	\$	2,329

Underground Costs

21	Racking/Grounding for 6'x14' Manhole	\$	47,375
63	Heat Shrink Splice	\$	203,309
4	46kV DE Riser – UG portion	\$	39,138
28,100	Conductor, 1/C 1500 KCM AL XLPE	\$	377,102

Outside Services/Other Costs

4	Dig/Set Pole	\$	15,000
2	Anchor hole excavation & set ¾" or 1"x8'	\$	5,000
LS	Underground Infrastructure	\$	5,830,000



Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI
Table of Contents

Table Number		Tab Name	Table Name
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2	Table 2	T&D Infrastructure I + A	Project Specific Inputs and Assumptions (T&D Infrastructure)
3	Table 3	Construction I + A	Project Specific Construction Inputs and Assumptions
A1	Appendix Table A1	RMEM (T&D Infrastructure)	Raw Materials Extraction & Manufacturing T&D Infrastructure GHG Emissions Calculations
A2	Appendix Table A2	Transportation	Material Transportation GHG Emissions Calculations
A3	Appendix Table A3	Construction	Construction GHG Emissions Calculations
A4	Appendix Table A4	Operations and Maintenance	Project Operations GHG Emissions Calculations
A5	Appendix Table A5	Decom. & Disposal	Decommissioning & Disposal GHG Emissions Calculations



Table 1
Project GHG Emissions by Stage
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

Project Stage		GHG Emissions (MT CO ₂ e) ^{1,2}	
		Low Range	High Range
Upstream ³	Raw Materials Extraction & Manufacturing ⁵	778	864
	Transportation ⁶	102	114
	Construction ⁷	221	296
Project Operations	Operations & Maintenance	4.2	4.2
Downstream ⁴	Transportation ⁶	7.0	7.8
	Decommissioning & Disposal ⁵	16	17
Total Project Operations⁸		4.2	
Total Project Lifecycle		1,127	1,303

Notes:

1. This table summarizes results from the GHG Analysis undertaken to determine Project GHG Emissions. The supporting calculations are provided in the Calculation tabs for each Project Stage; each tab provides live cell logic, references, calculations and formulas unhidden and unprotected. Note that numbers may not add to totals due to rounding.
2. Project GHG Emissions estimates for Major Equipment are based on the most current information, including emissions factors, available to Ramboll at the time the analysis was completed.
3. Upstream Transportation and Construction Stages include all construction and transportation activity related to the installation of the proposed project activities, as described in more detail in the Transportation and Construction calculation tables.
4. Downstream decommissioning and disposal emissions include emissions associated with the removal and disposal of Project equipment.
5. The low range of Project GHG Emissions for raw material extraction and manufacturing ("RMEM") and decommissioning & disposal ("D&D") assumes Major Equipment accounts for 100% of emissions for the stage, while the high range assumes Major Equipment accounts for 90% and miscellaneous (non-major) equipment contribute 10% of Project GHG Emissions for the stage.
6. The low range of Project Transportation GHG Emissions assumes Major Equipment accounts for 100% of Project Transportation GHG Emissions, while the high range assumes Major Equipment accounts for 89% and miscellaneous equipment contribute 11% of Project Transportation GHG Emissions.
7. Construction GHG Emissions were determined as a range of low to high based on the lowest and highest Construction GHG Intensities determined for previous T&D projects. Construction emissions from helicopter usage were modeled separately and added to the range of low to high intensities to calculate the Project Construction GHG Emissions.
8. Total Project Operations includes GHG emissions from the Operations & Maintenance (Use) stage of the Project.

Abbreviations:

- CO₂e - carbon dioxide equivalent
- GHG - greenhouse gas
- MT - metric ton
- T&D - transmission and distribution



Table 2
Project Specific Inputs and Assumptions (T&D Infrastructure)
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

	Description	Input	Unit	Reference
General Project	General Project			
	Project Name	Koa Ridge Line B Relocation	--	Provided by developer.
	Project Location (Island)	O'ahu	--	Provided by developer.
	Project Lifetime	50	yr	Provided by developer.
	Project Site Area	353	acres	Provided by developer.
	Percent of Routine Auxiliary Energy or Parasitic Load Onsite that is Supplied from the Grid	0%	%	Provided by developer.
	Island Location of Site (Final Port Location)	Honolulu Harbor	--	Determined based on Project Location (Island).
	Distance from Final Hawai'i Port to Site Location	15	mi	Distance from Honolulu Harbor to Site.
Transmission & Distribution				
Overhead Transmission Line	Overhead Transmission Line	Yes		Provided by developer.
	Transmission Line Voltage	46	kV	Provided by developer.
	Transmission Line Material	All Aluminum Conductor	--	Provided by developer.
	Location of Transmission Line Manufacturer	Florence, Alabama	--	Confirmed by developer.
	Length of Transmission Line (linear feet)	9,360	ft	Provided by developer.
	Conductor + Bulk of System	46,773	kg	Conservatively estimated based on material requirements per km of 150 kV aerial transmission line from Table S5 of Jorge et al. (2011a), and assumed to account for bulk of transmission line system (e.g. circuit breakers, insulators, conductors). ¹ This accounts for a 3-phase aluminum conductor and a single-phase aluminum shield wire.
	Equipment Lifetime (Expected Useful Life of the Equipment)	50	yr	Provided by developer.
	Number of Equipment over Project Lifetime	1	item	Estimated based on lifetime of equipment and Project lifetime.
	End of Life Treatment	Decommissioning and disposal	--	Confirmed by developer.
	Steel Pole with Concrete Foundation (130')	Yes		Provided by developer.
	Number of Steel Poles (w/ concrete foundation)	12	item	Provided by developer.
	Weight of Each Steel Pole	6,645	kg	Confirmed by developer.
	Height of Steel Poles (w/ concrete foundation)	130	ft	Provided by developer.
	Volume of concrete foundation (length x width x height)	99	ft ³	Confirmed by developer.
	Weight of Each Concrete Foundation	14,850	lb	Confirmed by developer.
	Location of Utility Pole Manufacturer - Steel Poles (w/ Concrete Foundation)	Valley, Nebraska	--	Confirmed by developer.
	Equipment Lifetime (Expected Useful Life of the Equipment)	58	yr	Confirmed by developer.
	Number of Equipment over Project Lifetime	12	item	Estimated based on lifetime of equipment and Project lifetime.
	Final Concrete Disposal Location	Local (Island Location of Site)	--	Confirmed by developer.
	End of Life Treatment	Decommissioning and disposal	--	Confirmed by developer.
	Steel Pole with Concrete Foundation (85')	Yes		Provided by developer.
	Number of Steel Poles (w/ concrete foundation)	1	item	Provided by developer.
	Weight of Each Steel Pole	3,463	kg	Confirmed by developer.
	Height of Steel Poles (w/ concrete foundation)	85	ft	Provided by developer.
	Volume of concrete foundation (length x width x height)	99	ft ³	Confirmed by developer.
	Weight of Each Concrete Foundation	14,850	lb	Confirmed by developer.
	Location of Utility Pole Manufacturer - Steel Poles (w/ Concrete Foundation)	Valley, Nebraska	--	Confirmed by developer.
	Equipment Lifetime (Expected Useful Life of the Equipment)	58	yr	Confirmed by developer.
	Number of Equipment over Project Lifetime	1	item	Estimated based on lifetime of equipment and Project lifetime.
	Final Concrete Disposal Location	Local (Island Location of Site)	--	Confirmed by developer.
	End of Life Treatment	Decommissioning and disposal	--	Confirmed by developer.
	Steel Pole with Concrete Foundation (55')	Yes		Provided by developer.
	Number of Steel Poles (w/ concrete foundation)	3	item	Provided by developer.
	Weight of Each Steel Pole	1,270	kg	Confirmed by developer.
	Height of Steel Poles (w/ concrete foundation)	55	ft	Provided by developer.
	Volume of concrete foundation (length x width x height)	99	ft ³	Confirmed by developer.
	Weight of Each Concrete Foundation	14,850	lb	Confirmed by developer.
	Location of Utility Pole Manufacturer - Steel Poles (w/ Concrete Foundation)	Valley, Nebraska	--	Confirmed by developer.
	Equipment Lifetime (Expected Useful Life of the Equipment)	58	yr	Confirmed by developer.
	Number of Equipment over Project Lifetime	3	item	Estimated based on lifetime of equipment and Project lifetime.
Final Concrete Disposal Location	Local (Island Location of Site)	--	Confirmed by developer.	
End of Life Treatment	Decommissioning and disposal	--	Confirmed by developer.	

Table 2
Project Specific Inputs and Assumptions (T&D Infrastructure)
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

	Description	Input	Unit	Reference
Miscellaneous Equipment	Miscellaneous Equipment			
	Percent Contribution of RMEM and D&D Emissions from Miscellaneous Equipment Relative to total Project RMEM and D&D Emissions	10%	%	Percent estimated based on analysis done on past GHG projects; background calculations are found in the Miscellaneous Equipment Analysis reference table.
	Percent Contribution of Transportation Emissions from Miscellaneous Equipment Relative to total Project Transportation Emissions	11%	%	Percent estimated based on analysis done on past GHG projects; background calculations are found in the Miscellaneous Equipment Analysis reference table.
Existing Equipment to be Removed	Existing Equipment to be Removed	Yes		Provided by developer.
	Decommissioning Activities included in Construction Activities	Yes	--	Provided by developer.
	Aluminum Transmission Line Conductor	Yes		Provided by developer.
	Transmission Line Material	Aluminum Transmission Line Conductor	--	Confirmed by developer.
	Number of Transmission Lines	1	Item	Provided by developer.
	Length of Transmission Line	9,360	ft	Provided by developer.
	Conductor + Bulk of System	46,773	kg	Conservatively estimated based on material requirements per km of 150 kV aerial transmission line from Table S5 of Jorge et al. (2011a), and assumed to account for bulk of transmission line system (e.g. circuit breakers, insulators, conductors). ¹ This accounts for a 3-phase aluminum conductor and a single-phase aluminum shield wire.
	Steel Utility Pole	Yes		Provided by developer.
	Type of Equipment to be Removed	Steel Utility Pole	--	Provided by developer.
	Number of Equipment per Type	12	Item	Provided by developer.
	Weight of Each Piece of Equipment	4,085	kg	Provided by developer.
	Wood Pole	Yes		Provided by developer.
	Type of Equipment to be Removed	Wood Pole	--	Provided by developer.
	Number of Equipment per Type	18	Item	Provided by developer.
	Weight of Each Piece of Equipment	1,500	kg	Provided by developer.
	Final Wood Pole Disposal Location	Local (Island Location of Site)	--	Wood pole disposal location provided by Hawaiian Electric.
	Anchor	Yes		Provided by developer.
	Type of Equipment to be Removed	Anchor	--	Provided by developer.
	Number of Equipment per Type	7	Item	Provided by developer.
	Weight of Each Piece of Equipment	123	kg	Provided by developer.
Use	Use (General)			
	Truck Trips for O&M	4	trips/year	Confirmed by developer.
	Truck Trip Distance for O&M	30	miles/round-trip	Confirmed by developer.
Decom. & Disposal	Decommissioning and Disposal of Proposed Project			
	Decommissioning Intensity Relative to Construction	3%	%	Based on GHG emissions estimated for construction and deconstruction phases for the Southern California Edison's Lakeview Substation Project, which includes substation and transmission line scope, and is therefore of similar scope to this Project. ²
GWP's	Global Warming Potentials			
	Carbon Dioxide	1.0	g CO ₂ e/g CO ₂	Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report (AR5), 2014. ³
	Methane	28	g CO ₂ e/g CH ₄	
	Nitrous Oxide	265	g CO ₂ e/g N ₂ O	

Abbreviations:

CH ₄ - methane	IPCC - Intergovernmental Panel on Climate Change
CO ₂ - carbon dioxide	kg - kilogram
CO ₂ e - carbon dioxide equivalent	kV - kilovolt
ft - feet	lb - pounds
ft ³ - cubic feet	mi - miles
GHG - greenhouse gas	N ₂ O - nitrous oxide
GWP - global warming potentials	yr - year
g - gram	

References:

- Jorge, R. S.; Hawkins, T. R.; Hertwich, E. G. (2011a). Life cycle assessment of electricity transmission and distribution - part 1: power lines and cables. International Journal of Life Cycle Assessment, 17, 1. Available at: <https://doi.org/10.1007/s11367-011-0335-1>.
- Southern California Edison's Lakeview Substation Project. 2012. Prepared for California Public Utilities Commission. Accessed: November 2019.
- Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report (AR5), 2014.



Table 3
Project Specific Construction Inputs and Assumptions
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

	Description	Input	Unit	Reference
General Project	General Project Construction			
	Construction Start Date (mm/dd/yyyy)	10/1/2023	--	Provided by developer.
	Construction End Date (mm/dd/yyyy)	12/31/2023	--	Provided by developer.
	Construction Site Area	353	acres	Provided by developer.
Helicopter Activities	Number of Construction Days	60	#	Provided by developer.
	Helicopter Activities	Yes		
	Helicopter	1	#	Provided by developer.
	Number of Days	8	days	Provided by developer. Assumes 4 days per pole installation.
Helicopter Activities	Helicopter Horsepower	9,000	horsepower	Confirmed by developer. Default helicopter horsepower was selected based on the helicopter model with specifications in line with the scope of this construction activity (i.e., heavy lifting). Emission factors are consistent with the Valley-Ivyglen and Alberhill System Project, which quantified GHG emissions from helicopter use during construction. ¹
	Helicopter Total Operating Hours	51	hours/helicopter	Helicopter total operating hours based on the number of days in the construction activity, the average usage hours, and the utilization rate of the helicopter.

Abbreviations:

- # - number
- GHG - greenhouse gas

References:

¹ Valley-Ivyglen and Alberhill System Project. Available at: <https://www.cpuc.ca.gov/environment/info/ene/alberhill/Alberhill.html>



Appendix Table A1
Raw Materials Extraction & Manufacturing T&D Infrastructure GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

System	Description	Total Items ¹	Weight per Item (kg) ¹	Lifecycle GHG Emission Factor	Units	Note	GHG Emissions (MT CO ₂ e)
Overhead Transmission Line	Conductor + Bulk of System	1	46,773	8.2	kg CO ₂ e/kg	2	385
	Steel Pole with Concrete Foundation (130') - Steel Pole	12	6,645	4.4	kg CO ₂ e/kg	3	350
	Steel Pole with Concrete Foundation (130') - Concrete Foundation	12	6,736	0.10	kg CO ₂ e/kg	4	8.5
	Steel Pole with Concrete Foundation (85') - Steel Pole	1	3,463	4.4	kg CO ₂ e/kg	3	15
	Steel Pole with Concrete Foundation (85') - Concrete Foundation	1	6,736	0.10	kg CO ₂ e/kg	4	0.71
	Steel Pole with Concrete Foundation (55') - Steel Pole	3	1,270	4.4	kg CO ₂ e/kg	3	17
Miscellaneous Equipment	Steel Pole with Concrete Foundation (55') - Concrete Foundation	3	6,736	0.10	kg CO ₂ e/kg	4	2.1
	Non-Major Equipment					5	86
				Total Project RMEM		Low:	778
						High:	864

Appendix Table A1
Raw Materials Extraction & Manufacturing T&D Infrastructure GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

Notes:

1. Project specifications, assumptions and references are provided in Table 2.
2. The GHG emission factor for the Conductor + Bulk of System is an estimate from Jorge, et al. (2011a) estimated emissions for a 150 kV overhead transmission line (Figure 1a), scaled based on the weight of the transmission line. The estimated emissions for an overhead transmission line are used because the transmission line material for this Project is of similar material to that of the overhead transmission line from Jorge, et al. (2011a). This factor represents total CO₂e emissions per kg of transmission line for components such as conductors, insulators, installation, and usage. Installation and usage together account for less than approximately 4% of total emissions, so these are conservatively included in addition to the Construction and Operations emissions estimated in Tables A3 and A4, respectively.
3. The GHG emission factor for the Steel Pole with Concrete Foundation - Steel Poles is obtained fromecoinvent using the IPCC Fifth Assessment Report GWP from Classen, M., market for steel, chromium steel 18/8, hot rolled, global geography ("GLO", e.g. value represents activities which are considered to be an average valid for all countries in the world, and are calculated as the average of the regional datasets that contain information for the activity), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.
4. The GHG emission factor for the Steel Pole with Concrete Foundation - Concrete Foundation is obtained fromecoinvent using the IPCC Fifth Assessment Report GWP from Martineau, G., market for concrete, 20MPa, North America geography ("RNA", e.g. value represents activities which are considered to be an average valid for all countries in North America, and are calculated as the average of the regional datasets that contain information for the activity), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1. The emission factor is normalized based on the density of concrete, approximately 2,335 kg/m³, provided in documentation of the dataset.
5. Miscellaneous Equipment are assumed to contribute up to 10% of the Raw Materials Extraction & Manufacturing (RMEM) and Decommissioning & Disposal (D&D) emissions relative to total Project RMEM and D&D emissions. Based on previous T&D GHG analyses done for Hawaiian Electric, emissions from miscellaneous (i.e. non-major) equipment not included in Table A1 above generally represent up to 10% of the total project RMEM and D&D emissions, as detailed in the Miscellaneous Equipment Analysis reference table. The results were conservatively rounded up to 2 significant figures.

Abbreviations:

- CO₂ - carbon dioxide
- CO₂e - carbon dioxide equivalent
- GHG - greenhouse gas
- GWP - global warming potential
- IPCC - Intergovernmental Panel on Climate Change
- kg - kilogram
- kV - kilovolts
- MT - metric ton
- T&D - transmission and distribution

References

- Classen, M., market for steel, chromium steel 18/8, hot rolled, GLO, Allocation, cut-off by classification, ecoinvent database version 3.7.1.
- Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report (AR5), 2014.
- Jorge, R. S.; Hawkins, T. R.; Hertwich, E. G. (2011a). Life cycle assessment of electricity transmission and distribution - part 1: power lines and cables. International Journal of Life Cycle Assessment, 17, 1. Available at: <https://doi.org/10.1007/s11367-011-0335-1>.
- Martineau, G., market for concrete, 20MPa, RNA, Allocation, cut-off by classification, ecoinvent database version 3.7.1.



Appendix Table A2
Material Transportation GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

Mode of Travel	Emission Factors ^{1,2}			
	CO ₂	CH ₄	N ₂ O	units
Truck	0.21	2.0E-06	4.9E-06	kg/ton-mi
Ship	--	--	--	kg/ton-mi

Transportation Emissions:

Shipment Item	Weight per Item (kg)	Total Items	Net Weight (MT) ³	Phase	Origin	Destination	Mode ⁴	Trip length (mi or nmi) ⁵	Trip Type ⁶	GHG Emissions (MT CO ₂ e)	
										Per Segment	Per Shipment Item Type
Overhead Transmission Line	Conductor + Bulk of System	1	47	Upstream	Florence, Alabama (Manufacturer/Warehouse)	Los Angeles (Port)	Truck	2,013	One-Way	22	24
					Los Angeles (Port)	Honolulu Harbor (Port)	Ship	2,231	One-Way	1.28	
					Honolulu Harbor (Port)	Site	Truck	15	Roundtrip	0.33	
	Steel Pole with Concrete Foundation (130')	12	161	Downstream	Honolulu Harbor (Port)	Honolulu Harbor (Port)	Truck	15	Roundtrip	0.33	1.9
					Los Angeles (Port)	Los Angeles (Scrap Yard)	Truck	2,231	One-Way	1.28	
					Valley, Nebraska (Manufacturer/Warehouse)	Los Angeles (Port)	Truck	25	One-Way	0.27	
	Steel Pole with Concrete Foundation (85')	1	10	Upstream	Los Angeles (Port)	Honolulu Harbor (Port)	Ship	2,231	One-Way	4.4	64
					Honolulu Harbor (Port)	Site	Truck	15	Roundtrip	1.1	
					Valley, Nebraska (Manufacturer/Warehouse)	Grace Pacific Landfill, O'ahu	Truck	11	Roundtrip	0.80	
	Steel Pole with Concrete Foundation (55')	3	24	Downstream	Los Angeles (Port)	Honolulu Harbor (Port)	Ship	2,231	One-Way	3.7	4.1
					Honolulu Harbor (Port)	Site	Truck	15	Roundtrip	0.28	
					Site	Grace Pacific Landfill, O'ahu	Truck	11	Roundtrip	0.072	
Existing Equipment to be Removed	Aluminum Transmission Line Conductor	1	47	Downstream	Valley, Nebraska (Manufacturer/Warehouse)	Los Angeles (Port)	Truck	1,562	One-Way	8.8	10
					Los Angeles (Port)	Honolulu Harbor (Port)	Ship	2,231	One-Way	0.66	
					Honolulu Harbor (Port)	Site	Truck	15	Roundtrip	0.17	
	Steel Utility Pole	12	49	Downstream	Site	Grace Pacific Landfill, O'ahu	Truck	11	Roundtrip	0.12	2.0
					Site	Honolulu Harbor (Port)	Truck	15	Roundtrip	0.33	
					Honolulu Harbor (Port)	Los Angeles (Port)	Ship	2,231	One-Way	1.3	
	Wood Pole	18	27	Downstream	Los Angeles (Port)	Los Angeles (Scrap Yard)	Truck	25	One-Way	0.29	0.21
					Site	PVT Land Company Landfill	Truck	16	Roundtrip	0.21	
					Site	Honolulu Harbor (Port)	Truck	15	Roundtrip	0.0060	
	Anchor	7	0.86	Downstream	Honolulu Harbor (Port)	Los Angeles (Port)	Ship	2,231	One-Way	0.024	0.035
					Los Angeles (Port)	Los Angeles (Scrap Yard)	Truck	25	One-Way	0.0050	

Appendix Table A2
Material Transportation GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

Mode of Travel	Emission Factors ^{1,2}			
	CO ₂	CH ₄	N ₂ O	units
Truck	0.21	2.0E-06	4.9E-06	kg/ton-mi
Ship	--	--	--	kg/MT-km

Transportation Emissions:

Shipment Item	Weight per Item (kg)	Total Items	Net Weight (MT) ³	Phase	Origin	Destination	Mode ⁴	Trip length (mi or nmi) ⁵	Trip Type ⁶	GHG Emissions (MT CO ₂ e)	
										Per Segment	Per Shipment Item Type
Miscellaneous Equipment ⁷		--		Upstream						13	
Non-Major Equipment				Downstream						0.86	
Total Project Transportation Upstream ⁸										Low:	102
Total Project Transportation Downstream ⁹										High:	114
Total Project Transportation										Low:	7.8
Total Project Transportation										High:	109
Total Project Transportation										High:	122

Notes:

- The emission factors for road transportation are taken from US Environmental Protection Agency (EPA) Scope 3 Inventory Guidance, which recommends emission factors from Table 8 of Emission Factors for Greenhouse Gas Inventories.
- The emission factor for shipping is based on the Global Maritime Emission Factor for dry (i.e., non-refrigerated) cargo shipping over all trade lanes for 2020 with a 70% utilization factor, assuming an average load weight of 10 tons in each container.
- The net weight is determined based on the weight of each item and the quantity of each item.
- For a given transportation segment, if the mode of travel is not known and if multiple travel modes are available, the most emissions-intensive mode is selected.
- The trip lengths for each leg of travel were estimated based on the following assumptions:
(a) Shipping distances were estimated using the Sea Distance tool, available at <https://sea-distances.org>.
(b) Truck distances were estimated using Google Maps to determine driving distances between the locations.
- GHG emissions are per segment (i.e. one-way travel) with the exception of estimated emissions to or from the site. These segments consider roundtrip travel and multiply the per segment GHG emissions by two to account for roundtrip travel. This approach conservatively treats the empty return trip as loaded.
- Miscellaneous Equipment are assumed to contribute 11% of the transportation emissions relative to total Project transportation emissions. Based on previous T&D GHG analyses done for Hawaiian Electric, emissions from miscellaneous (i.e. non-major) equipment not included in Table A2 above generally represent up to 11% of the total project transportation emissions, as detailed in the Balance of System Analysis reference table.
- Upstream transportation emissions include emissions from transporting the project materials from manufacturing to the project site.
- Downstream transportation emissions include emissions from transporting the project materials from the project site to disposal at the scrap yard.

Abbreviations:

- CH₄ - methane
- CN - Canadian National
- CO₂ - carbon dioxide
- CO₂e - carbon dioxide equivalent
- GHG - greenhouse gas
- GWP - global warming potential
- kg - kilogram
- km - kilometer
- mi - mile
- MT - metric ton
- nmi - nautical mile
- N₂O - nitrous oxide
- T&D - transmission and distribution

References:

- EPA. Scope 3 Inventory Guidance. Available at: <https://www.epa.gov/climateleadership/scope-3-inventory-guidance>
- EPA (2022). Emission Factors for Greenhouse Gas Inventories. April 1. Available at: https://www.epa.gov/system/files/documents/2022-04/ghg_emission_factors_hub.pdf
- Global Maritime Emission Factors. Available at: <https://www.bsr.org/files/clean-cargo/BSR-Clean-Cargo-Emissions-Report-2021.pdf>



Appendix Table A3
Construction GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI

Phase	Equipment Type ¹	Total Items ¹	Number of Days	Avg. Usage Hours per Day	Utilization Rate	Hours of Operation (hr/project)	Horsepower ²	EF (g/bhp-hr) ³			GHG Emissions ⁴ (MT CO ₂ e)
								CO ₂	CH ₄	CO ₂ e	
Helicopter Activities	Helicopter	1	8	8.0	0.80	51	9,000	393	0.01	393	181

T&D Construction Emissions Summary

Component	Construction Duration (days)	Scenario	Construction GHG Intensity (MT CO ₂ e / day) ⁵	GHG Emissions (MT CO ₂ e)
Construction GHG Emissions	60	Low High	0.7 1.9	40 115
Additional Emissions from Helicopter Activities ⁶		--		181
Total Project Construction				Low: 221 High: 296

Notes:

- Project specifications and references are provided in Table 3.
- Emission factor for helicopters is obtained from the Valley-Ivygien and Alberhill System Project. It does not contain emission factors for N₂O emissions, which are expected to be minimal compared to overall offroad GHG emissions.
- Offroad GHG emissions are calculated using a g/bhp-hr emission factor. This emission factor is multiplied by the hours of operation and horsepower for each piece of equipment, then converted from grams to metric tons.
- The Construction GHG Emissions were analyzed as a range of low to high based on the lowest and highest Construction GHG Intensities determined for past T&D projects. The Construction GHG Intensities were calculated by dividing the Construction GHG Emissions for T&D construction activities over the number of construction days. The Construction GHG Emissions for the Project were calculated by multiplying the construction GHG intensity from past T&D GHG analyses done for Hawaiian Electric by the construction duration (in days) of the Project. Detailed calculations can be found in the Construction Intensity Analysis reference table.
- Emissions from helicopter usage were calculated separately and added on to the estimated construction emissions for the Project based on the GHG intensity range from past T&D projects.

Abbreviations:

- bhp - brake horsepower
- CH₄ - methane
- CO₂ - carbon dioxide
- CO₂e - carbon dioxide equivalent
- EF - emissions factor
- g - gram
- GHG - greenhouse gas
- hr - hour
- mi - mile
- MT - metric ton
- N₂O - nitrous oxide
- T&D - Transmission and distribution

References:

Valley-Ivygien and Alberhill System Project. Available at: <https://www.cpuc.ca.gov/environment/info/ene/alberhill/Alberhill.html>



**Appendix Table A4
Project Operations GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI**

Inputs:

Source ¹	Input	Value	Units
	First Year of Operation	2024	--
T&D - Mobile (Trucks) ²	Annual Truck Trips	4	trips/yr
	Truck Trip VMT	30	mi/round-trip

Emission Factors:

Source	Details	CO ₂	CH ₄	N ₂ O	CO ₂ e	Units
T&D - Truck Maintenance Trips ³	LHDT1	686	0.0084	0.045	--	g/mi
		24	0.024	0.030	--	g/trip

Greenhouse Gas Emissions:

Source	Subcategory	Emissions (MT/yr)			
		CO ₂	CH ₄	N ₂ O	CO ₂ e
Mobile Emissions	T&D - Truck Maintenance Trips	0.082	1.1E-06	5.5E-06	0.084
Years of Operation					50
Project Operations per Year					0.084
Total Project Operations					4.2

Notes:

- Project specifications, assumptions and references are provided in Table 2.
- Mobile truck trips represent small trucks that drive to the transmission line to perform routine operations and management procedures. Annual Truck Trips and Truck Trip VMT are provided in Table 2.
- Mobile emission factors are from California's EMFAC2021 database. Emission factors were estimated by averaging statewide emission factors in 2024 for LHDT1 vehicles. Mobile emission factors from California's EMFAC database represent a reasonable estimate of mobile emission factors for the Project. Hawaii does not maintain a publicly-accessible database like EMFAC that could be used to assess location-specific vehicle fleet data in future years. However, 2015 data on average fuel economy for the existing light-duty fleets show relatively minor differences between Hawaii, California, and US-average vehicles. Given that onroad vehicles represent a small portion of lifecycle emissions for the Project, any adjustments to these emission factors would not result in significant changes to the resulting emissions.

Abbreviations:

CH ₄ - methane	mi - miles
CO ₂ - carbon dioxide	MT - metric ton
CO ₂ e - carbon dioxide equivalent	N ₂ O - nitrous oxide
EMFAC - Emissions FACtor model	T&D - transmission and distribution
g - grams	VMT - vehicle miles traveled
GWP - global warming potential	yr - year
LHDT1 - light-heavy-duty truck	

References

California Air Resources Board (CARB) 2022. EMFAC2021. Available at: <https://arb.ca.gov/emfac/emissions-inventory>.



**Appendix Table A5
Decommissioning & Disposal GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI**

Decommissioning and Disposal:

System	Stages	Components	Total Items ¹	Weight per Item (kg) ¹	Lifecycle GHG Emission Factor	Units	Note	GHG Emissions (MT CO ₂ e)		
Existing Equipment to be Removed	Disposal	Conductor + Bulk of System	1	46,773	0.017	kg CO ₂ e/kg disposed	2	0.80		
		Steel Utility Pole	12	4,085	0.0083	kg CO ₂ e/kg disposed	4	0.41		
		Wood Pole	18	1,500	0.11	kg CO ₂ e/kg disposed	5	3.0		
		Anchor	7	123	0.0083	kg CO ₂ e/kg disposed	6	0.0072		
		Conductor + Bulk of System	1	46,773	0.017	kg CO ₂ e/kg disposed	2	0.80		
		Steel Pole with Concrete Foundation (130')	12	6,645	0.0083	kg CO ₂ e/kg disposed	7	0.66		
		Steel Pole with Concrete Foundation (130') - Concrete Foundation	12	6,736	0.0083	kg CO ₂ e/kg disposed	8	0.67		
Overhead Transmission Line	Disposal	Steel Pole with Concrete Foundation (85') - Steel Pole	1	3,463	0.0083	kg CO ₂ e/kg disposed	7	0.029		
		Steel Pole with Concrete Foundation (85') - Concrete Foundation	1	6,736	0.0083	kg CO ₂ e/kg disposed	8	0.056		
		Steel Pole with Concrete Foundation (55') - Steel Pole	3	1,270	0.0083	kg CO ₂ e/kg disposed	7	0.032		
		Steel Pole with Concrete Foundation (55') - Concrete Foundation	3	6,736	0.0083	kg CO ₂ e/kg disposed	8	0.17		
		Miscellaneous Equipment	Disposal					9	1.0	
		Proposed Project	Decommissioning	T&D Infrastructure System					10	8.9
				Decommissioning					Low: High:	16 17

Notes:

- Project specifications, assumptions and references are provided in Table 2.
- The GHG emission factor for the Conductor + Bulk of System is obtained from ecoinvent using the IPCC Fifth Assessment Report GWP from Doka, G., market for scrap aluminum, Rest of world geography ("RoW", e.g. datasets (activities) with this geography contain data for the rest of the world datasets which are not represented in the ecoinvent database for specific regions), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.
- The GHG emission factor for the OPGW (Optical Ground Wire) Cable is obtained from ecoinvent using the IPCC Fifth Assessment Report GWP from Hischer, R., market for used industrial electronic device, WEEE collection, Rest of world geography ("RoW", e.g. datasets (activities) with this geography contain data for the rest of the world datasets which are not represented in the ecoinvent database for specific regions), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.
- The GHG emission factor for the Steel Poles is obtained from ecoinvent using the IPCC Fifth Assessment Report GWP from Hischer, R., market for scrap steel, Rest of world geography ("RoW", e.g. datasets (activities) with this geography contain data for the rest of the world datasets which are not represented in the ecoinvent database for specific regions), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.
- The GHG emission factor for the Wood Poles is obtained from ecoinvent using the IPCC Fifth Assessment Report GWP from Doka, G., market for waste wood, untreated, Rest of world geography ("RoW", e.g. datasets (activities) with this geography contain data for the rest of the world datasets which are not represented in the ecoinvent database for specific regions), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.

**Appendix Table A5
Decommissioning & Disposal GHG Emissions Calculations
Koa Ridge Line B Relocation GHG Analysis
O'ahu, HI**

6. The GHG emission factor for the Anchors is obtained from ecoinvent using the IPCC Fifth Assessment Report GWP from Hirschler, R., market for scrap steel, Rest of world geography ("RoW", e.g. datasets (activities) with this geography contain data for the rest of the world datasets which are not represented in the ecoinvent database for specific regions), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.
7. The GHG emission factor for the Steel Pole with Concrete Foundation - Steel Pole is obtained from ecoinvent using the IPCC Fifth Assessment Report GWP from Hirschler, R., market for scrap steel, Rest of world geography ("RoW", e.g. datasets (activities) with this geography contain data for the rest of the world datasets which are not represented in the ecoinvent database for specific regions), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.
8. The GHG emission factor for the Steel Pole with Concrete Foundation - Concrete Foundation is obtained from ecoinvent using the IPCC Fifth Assessment Report GWP from Doka, G., market for waste concrete, Rest of world geography ("RoW", e.g. datasets (activities) with this geography contain data for the rest of the world datasets which are not represented in the ecoinvent database for specific regions), System Model Allocation, cut-off by classification ("Allocation, cut-off by classification", e.g. a producer is fully responsible for the disposal of its wastes and does not receive any credit for the provision of any recyclable materials), ecoinvent database version 3.7.1.
9. Miscellaneous Equipment are assumed to contribute 10% of the Raw Materials Extraction & Manufacturing (RMEM) and Decommissioning & Disposal (D&D) emissions relative to total Project RMEM and D&D emissions. Based on previous T&D GHG analyses done for Hawaiian Electric, emissions from miscellaneous (i.e. non-major) equipment not included in Table A1 above generally represent up to 10% of the total project RMEM and D&D emissions, as detailed in the Miscellaneous Equipment Analysis reference table.
10. T&D Infrastructure system decommissioning emissions are conservatively assumed to be a percentage of the high range of construction emissions, as detailed in the Decommissioning and Disposal of Proposed Project, Decommissioning Intensity Relative to Construction inputs in Table 2 and in the Decommissioning Intensity reference tab.

Abbreviations:

CO₂e - carbon dioxide equivalent
GHG - greenhouse gas
GLO - global
GWP - global warming potential
IPCC - Intergovernmental Panel on Climate Change
kg - kilogram
MT - metric ton
RoW - rest of world
T&D - transmission and distribution
WEEE - Waste Electrical and Electronic Equipment

References

Doka, G., market for scrap aluminum, RoW, Allocation, cut-off by classification, ecoinvent database version 3.7.1.
Doka, G., market for waste concrete, RoW, Allocation, cut-off by classification, ecoinvent database version 3.7.1.
Doka, G., market for waste wood, untreated, RoW, Allocation, cut-off by classification, ecoinvent database version 3.7.1.
Hirschler, R., market for scrap steel, RoW, Allocation, cut-off by classification, ecoinvent database version 3.7.1.
Hirschler, R., market for used industrial electronic device, WEEE collection, RoW, Allocation, cut-off by classification, ecoinvent database version 3.7.1.
Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report (AR5), 2014.
Southern California Edison's Lakeview Substation Project. 2012. Prepared for California Public Utilities Commission. Accessed: November 2019.

Wahiawa-Waimano 46kV Overhead Sub-Transmission Line Relocation
Summary

		Wahiawa-Waimano 46kV Overhead Sub-Transmission Line Relocation						
		356 - OH						
		355 - Pole and Fixtures	Conductors and Devices	Total	Sales Forecast ^{1, 2}	Rate Impact	Bill Impact	
Year		Revenue Requirement	Revenue Requirement	Revenue Requirement	(MWh)	cents per kWh	500 kwh ³	
1	2023	157,999	52,666	210,665	6,273,212	0.0034	\$ 0.02	
2	2024	359,334	125,696	485,030	6,331,067	0.0077	\$ 0.04	
3	2025	350,140	122,210	472,350	6,406,658	0.0074	\$ 0.04	
4	2026	341,388	118,871	460,259	6,482,196	0.0071	\$ 0.04	
5	2027	333,045	115,667	448,712	6,492,740	0.0069	\$ 0.03	
6	2028	325,078	112,590	437,669	6,523,977	0.0067	\$ 0.03	
7	2029	317,462	109,629	427,091	6,560,398	0.0065	\$ 0.03	
8	2030	310,168	106,776	416,944	6,631,911	0.0063	\$ 0.03	
9	2031	303,055	103,983	407,038	6,665,728	0.0061	\$ 0.03	
10	2032	295,968	101,199	397,167	6,702,393	0.0059	\$ 0.03	
11	2033	288,881	98,414	387,295	6,758,780	0.0057	\$ 0.03	
12	2034	295,496	100,197	395,693	6,805,389	0.0058	\$ 0.03	
13	2035	287,432	97,087	384,519	6,863,438	0.0056	\$ 0.03	
14	2036	279,367	93,977	373,345	6,948,570	0.0054	\$ 0.03	
15	2037	271,303	90,867	362,170	7,006,134	0.0052	\$ 0.03	
16	2038	263,239	87,757	350,996	7,085,142	0.0050	\$ 0.02	
17	2039	255,175	84,647	339,822	7,189,657	0.0047	\$ 0.02	
18	2040	247,111	81,537	328,648	7,340,133	0.0045	\$ 0.02	
19	2041	239,047	78,427	317,474	7,426,478	0.0043	\$ 0.02	
20	2042	230,983	75,317	306,300	7,557,265	0.0041	\$ 0.02	
21	2043	223,864	72,522	296,385	7,702,452	0.0038	\$ 0.02	
22	2044	218,634	70,357	288,990	7,876,186	0.0037	\$ 0.02	
23	2045	214,349	68,506	282,855	8,016,180	0.0035	\$ 0.02	
24	2046	210,064	66,656	276,720	8,178,832	0.0034	\$ 0.02	
25	2047	205,779	64,806	270,585	8,342,656	0.0032	\$ 0.02	
26	2048	201,495	62,956	264,450	8,524,276	0.0031	\$ 0.02	
27	2049	197,210	61,105	258,315	8,650,308	0.0030	\$ 0.01	
28	2050	192,925	59,255	252,180	8,780,481	0.0029	\$ 0.01	
29	2051	188,640	57,405	246,045	8,780,481	0.0028	\$ 0.01	
30	2052	184,355	55,555	239,910	8,780,481	0.0027	\$ 0.01	
31	2053	180,070	53,704	233,775	8,780,481	0.0027	\$ 0.01	
32	2054	175,786	51,854	227,640	8,780,481	0.0026	\$ 0.01	
33	2055	171,501	50,004	221,505	8,780,481	0.0025	\$ 0.01	
34	2056	167,216	48,153	215,369	8,780,481	0.0025	\$ 0.01	
35	2057	162,931	46,303	209,234	8,780,481	0.0024	\$ 0.01	
36	2058	158,646	44,453	203,099	8,780,481	0.0023	\$ 0.01	
37	2059	154,362	42,603	196,964	8,780,481	0.0022	\$ 0.01	
38	2060	150,077	40,752	190,829	8,780,481	0.0022	\$ 0.01	
39	2061	145,792	38,902	184,694	8,780,481	0.0021	\$ 0.01	
40	2062	141,507	37,052	178,559	8,780,481	0.0020	\$ 0.01	
41	2063	137,222	35,202	172,424	8,780,481	0.0020	\$ 0.01	
42	2064	132,937	33,351	166,289	8,780,481	0.0019	\$ 0.01	
43	2065	128,653	31,501	160,154	8,780,481	0.0018	\$ 0.01	
44	2066	124,368	29,651	154,019	8,780,481	0.0018	\$ 0.01	
45	2067	120,083	27,801	147,884	8,780,481	0.0017	\$ 0.01	
46	2068	115,798	0	115,798	8,780,481	0.0013	\$ 0.01	
47	2069	111,513	0	111,513	8,780,481	0.0013	\$ 0.01	
48	2070	107,229	0	107,229	8,780,481	0.0012	\$ 0.01	
49	2071	102,944	0	102,944	8,780,481	0.0012	\$ 0.01	
50	2072	98,659	0	98,659	8,780,481	0.0011	\$ 0.01	
51	2073	94,374	0	94,374	8,780,481	0.0011	\$ 0.01	
52	2074	90,089	0	90,089	8,780,481	0.0010	\$ 0.01	
53	2075	85,804	0	85,804	8,780,481	0.0010	\$ 0.00	
54	2076	81,520	0	81,520	8,780,481	0.0009	\$ 0.00	
55	2077	77,235	0	77,235	8,780,481	0.0009	\$ 0.00	
56	2078	72,950	0	72,950	8,780,481	0.0008	\$ 0.00	
57	2079	68,665	0	68,665	8,780,481	0.0008	\$ 0.00	
58	2080	64,380	0	64,380	8,780,481	0.0007	\$ 0.00	
59	2081	0	0	0				
60	2082	0	0	0				
Total		11,211,297	3,207,924	14,419,222		Average	\$ 0.02	
NPV @	6.88%	3,763,133	1,251,964	5,015,097				

Notes:
1. Using 2050 forecasted sales for years thereafter
2. HE Sales Forecast developed in early 2020 for IGP obtained from Forecasting Division
3. Hawaiian Electric typical residential energy consumption, per month

Wahiawa-Waimano 46kV Overhead Sub-Transmission Line Relocation
Revenue Requirements Model

Manual input

HECO TY2020 Rate Case Dkt 2019-0085 Final D&O 37387

Cost of Capital Assumptions

	Weight	Rate	Weighted Average	After-Tax Weighted Average	Weighted Average Revenue Requirement	Weighted Average Gross-up for Income Taxes
Short Term Debt	0.58%	2.50%	0.01%	0.01%	0.016%	0.01%
Long Term Debt (Taxable Debt)	41.42%	4.55%	1.88%	1.40%	2.068%	1.88%
Hybrids	0.00%	0.00%	0.00%	0.00%	0.000%	0.00%
Preferred Stock	0.85%	5.33%	0.05%	0.05%	0.067%	0.06%
Common Stock	57.15%	9.50%	5.43%	5.43%	8.026%	7.31%
	100.00%		7.37%	6.885%	10.177%	9.272%

Tax Assumptions

		Effective	
Federal Income Tax Rate	21.00%	19.74%	
State Income Tax Rate	6.40%	6.02%	
		25.75%	
State Investment Tax Credit (ITC)		4.00%	
Accelerated State ITC Amortization Period ^d		10	
Public Service Company Tax		5.885%	
PUC Fee		0.500%	
Franchise Tax		2.500%	
Composite Revenue Tax Rate		8.885%	1.09751

Project Assumptions

	356 - OH		Total
	355 - Pole and Fixtures	Conductors and Devices	
Allocation between Acct 355 and 356 ²	75%	25%	100%
Capital Investment ²	\$ 3,232,363	\$ 1,077,454	\$ 4,309,817

Place in Service Dec-23
Recovery mechanism ARA

Depreciation	356 - OH	
	355 - Pole and Fixtures	Conductors and Devices
Expected Useful Life ²	58	45
MACRS Tax Life ("Tax Life") ³	20	20
Tax Class Life ("Class Life") ³	30	30

O&M

O&M	Annual	\$ -	\$ -
Escalation Rate		2.0%	2.0%

Notes:

1. Per HECO 2020 TY Rate Case Parties' Stipulated Settlement Letter in Docket No. 2019-0085, State ITC Amortization accelerated over a ten-year period.
2. Capital investment and allocation percentage from T&D Engineering.
3. Per Corporate Tax Specialist of HEI Corporate Taxes

Waiawa-Waimano 46kV Overhead Sub-Transmission Line Relocation		Tax Depreciation																								
Tax Depreciation Factors		Tax Depreciation																								
Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Manual Input																										
Tax Depreciation Rates (Straight Line)																										
-																										
3	16.670%	33.330%	16.670%																							
5	10.000%	20.000%	20.000%	20.000%	20.000%	10.000%	14.290%	7.140%																		
7	7.140%	14.290%	14.290%	14.290%	14.290%	10.000%	14.290%	10.000%	10.000%	10.000%	10.000%	5.000%														
10	5.000%	10.000%	10.000%	10.000%	10.000%	10.000%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%
15	3.330%	6.670%	6.670%	6.670%	6.670%	6.670%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%
20	2.500%	5.000%	5.000%	5.000%	5.000%	5.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%
25	2.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%	4.000%
28	1.786%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%	3.571%
30	1.667%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%
35	1.429%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%	2.857%
50	1.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%
Source: IRS Publication 946, Table A-8																										
Tax Depreciation Rates (MACRS)																										
-																										
3	33.330%	44.450%	14.810%	7.410%																						
5	20.000%	32.000%	19.200%	11.520%	11.520%	5.760%																				
7	14.290%	24.490%	17.490%	12.490%	8.930%	8.930%	8.930%	4.460%																		
10	10.000%	18.000%	14.400%	11.520%	9.220%	7.370%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%	6.550%
15	5.000%	9.500%	8.500%	7.700%	6.930%	6.230%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%	5.900%
20	3.750%	7.219%	6.177%	6.177%	5.713%	5.285%	4.888%	4.522%	4.462%	4.461%	4.462%	4.461%	4.462%	4.461%	4.462%	4.461%	4.462%	4.461%	4.462%	4.461%	4.462%	4.461%	4.462%	4.461%	4.462%	4.461%
Source: IRS Publication 946, Table A-1																										

Wahiawa-Waimano 46kV Over		Tax Depreciation Factors												Tax Depreciation																						
Manual Input	Years	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57				
Tax Depreciation Rate:																																				
	-																																			
	3																																			
	5																																			
	7																																			
	10																																			
	15																																			
	20																																			
	25																																			
	28	3.572%	3.571%	1.786%																																
	30	3.334%	3.333%	3.334%	3.333%	1.667%																														
	35	2.857%	2.858%	2.857%	2.858%	2.857%	2.858%	2.857%	2.858%	2.857%	1.429%																									
	50	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	
Source: IRS Publication 946, Tr																																				
Tax Depreciation Rate:																																				
	-																																			
	3																																			
	5																																			
	7																																			
	10																																			
	15																																			
	20																																			
Source: IRS Publication 946, Tr																																				

Tax Depreciation

Wahiawa-Waimano 46KV Over			
Tax Depreciation Factors			
Manual Input	Years	58	60
			Total
Tax Depreciation Rate:			
	-		
	3		100.000%
	5		100.000%
	7		100.000%
	10		100.000%
	15		100.000%
	20		100.000%
	25		100.000%
	28		100.000%
	30		100.000%
	35		100.000%
	50		100.000%
Source: IRS Publication 946, Tr			
Tax Depreciation Rate:			
	-		
	3		100.000%
	5		100.000%
	7		100.000%
	10		100.000%
	15		100.000%
	20		100.000%
Source: IRS Publication 946, Tr			

Particulars	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Part A: Revenue	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.23	1.25	1.27	1.30	1.33	1.35	1.37	1.40	1.43	1.46	1.48	1.52	1.55	1.58	1.61
Part B: Expenses	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.23	1.25	1.27	1.30	1.33	1.35	1.37	1.40	1.43	1.46	1.48	1.52	1.55	1.58	1.61
Part C: Net Income	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.23	1.25	1.27	1.30	1.33	1.35	1.37	1.40	1.43	1.46	1.48	1.52	1.55	1.58	1.61
Part D: Other Items	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.23	1.25	1.27	1.30	1.33	1.35	1.37	1.40	1.43	1.46	1.48	1.52	1.55	1.58	1.61
Part E: Total	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.23	1.25	1.27	1.30	1.33	1.35	1.37	1.40	1.43	1.46	1.48	1.52	1.55	1.58	1.61

EXHIBIT XI
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	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Part A - Revenue and Expenses																											
Operating Revenue	1,677	1,571	1,711	1,744	1,811	1,861	1,882	1,922	1,982	2,041	2,098	2,157	2,216	2,275	2,334	2,393	2,452	2,511	2,570	2,629	2,688	2,747	2,806	2,865	2,924	2,983	3,042
Operating Expenses	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925
Operating Profit	(248)	(354)	(214)	(181)	(114)	(143)	(143)	(103)	(143)	(184)	(227)	(269)	(309)	(359)	(409)	(459)	(509)	(559)	(609)	(659)	(709)	(759)	(809)	(859)	(909)	(959)	(1,009)
Other Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Income Before Tax	(248)	(354)	(214)	(181)	(114)	(143)	(143)	(103)	(143)	(184)	(227)	(269)	(309)	(359)	(409)	(459)	(509)	(559)	(609)	(659)	(709)	(759)	(809)	(859)	(909)	(959)	
Tax Expense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Income After Tax	(248)	(354)	(214)	(181)	(114)	(143)	(143)	(103)	(143)	(184)	(227)	(269)	(309)	(359)	(409)	(459)	(509)	(559)	(609)	(659)	(709)	(759)	(809)	(859)	(909)	(959)	
Net Income	(248)	(354)	(214)	(181)	(114)	(143)	(143)	(103)	(143)	(184)	(227)	(269)	(309)	(359)	(409)	(459)	(509)	(559)	(609)	(659)	(709)	(759)	(809)	(859)	(909)	(959)	
Part B - Balance Sheet																											
Assets	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Liabilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

EXHIBIT XI
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Williams Petroleum Refining Operating Results For the Year Ended December 31, 2012											
GAAP	53	54	55	56	57	58	59	60	61	62	Total
Plant Asset Depreciation	1,752	1,752	1,752	1,752	1,752	1,752	1,752	1,752	0.00%	0.00%	100.00%
Book Depreciation	56,708	56,708	56,708	56,708	56,708	56,708	56,708	56,708	0.00%	0.00%	100.00%
Accumulated Depreciation	2,988,822	3,005,530	3,062,238	3,118,947	3,175,655	3,232,363	3,289,071	3,345,780	0.00%	0.00%	3,345,780
Intangible Assets	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Intangible Assets (Straight Line)	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Intangible Assets (Other)	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Net Intangible Assets (Straight Line)	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Net Intangible Assets (Other)	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Intangible Assets	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
State Income Tax Credit (LTC)	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
State Income Tax Credit (LTC)	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated State Income Tax Credit (LTC)	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Deferred Tax	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Deferred Tax	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Deferred Tax	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Other	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Other	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Other	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Deferred Tax Calculation	2,948,822	3,005,530	3,062,238	3,118,947	3,175,655	3,232,363	3,289,071	3,345,780	0.00%	0.00%	3,345,780
The Accumulated Depreciation	2,948,822	3,005,530	3,062,238	3,118,947	3,175,655	3,232,363	3,289,071	3,345,780	0.00%	0.00%	3,345,780
Deferred Tax	2,948,822	3,005,530	3,062,238	3,118,947	3,175,655	3,232,363	3,289,071	3,345,780	0.00%	0.00%	3,345,780
Net Deferred Tax Asset (Liability)	2,948,822	3,005,530	3,062,238	3,118,947	3,175,655	3,232,363	3,289,071	3,345,780	0.00%	0.00%	3,345,780
Deferred Tax Assets	2,948,822	3,005,530	3,062,238	3,118,947	3,175,655	3,232,363	3,289,071	3,345,780	0.00%	0.00%	3,345,780
Deferred Tax - Federal	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110	0.00%	0.00%	1,110
Deferred Tax - State	1,838	1,838	1,838	1,838	1,838	1,838	1,838	1,838	0.00%	0.00%	1,838
Deferred Tax - Other	0	0	0	0	0	0	0	0	0.00%	0.00%	0
Accumulated Deferred Tax	2,948,822	3,005,530	3,062,238	3,118,947	3,175,655	3,232,363	3,289,071	3,345,780	0.00%	0.00%	3,345,780
Change in Deferred Tax	0	0	0	0	0	0	0	0	0.00%	0.00%	0
State and Federal	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
State and Federal	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated State and Federal	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Other	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Other	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Other	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Revenue	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Revenue	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Revenue	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Operating Expenses	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Operating Expenses	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Operating Expenses	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Income	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Income	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Income	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Net Income	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Net Income	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%
Accumulated Net Income	0	0	0	0	0	0	0	0	0.00%	0.00%	0.00%

Hawaiian Electric Co., Inc.
TOTAL GWH SALES FORECAST (INCLUDING FUTURE LAYERS)
HE IGP August 2021 Revised Base

Year	Total GWh Sales
2020	5,804.4
2021	6,227.1
2022	6,278.3
2023	6,273.2
2024	6,331.1
2025	6,406.7
2026	6,482.2
2027	6,492.7
2028	6,524.0
2029	6,560.4
2030	6,631.9
2031	6,665.7
2032	6,702.4
2033	6,758.8
2034	6,805.4
2035	6,863.4
2036	6,948.6
2037	7,006.1
2038	7,085.1
2039	7,189.7
2040	7,340.1
2041	7,426.5
2042	7,557.3
2043	7,702.5
2044	7,876.2
2045	8,016.2
2046	8,178.8
2047	8,342.7
2048	8,524.3
2049	8,650.3
2050	8,780.5

Provided by Forecasting Department

EXHIBIT XII

Hawaiian Electric hereby identifies redacted confidential information that will be submitted confidentially upon issuance of a Protective Order in this proceeding. This log (1) identifies, in reasonable detail, the confidential information’s source, character, and location; (2) states clearly the basis for the claim of confidentiality; and (3) describes, with particularity, the cognizable harm to the producing party or participant from any misuse or unpermitted disclosure of the information.

Reference	Identification of Item	Basis of Confidentiality	Harm
Exhibit 6 Land Purchase Request	Easement Compensation Amount	Confidential commercial and contractual information which falls under the frustration of legitimate government function exception of the Uniform Information Practices Act (“UIPA”). ¹	Disclosure of the confidential information to the general public could disadvantage and competitively harm the Company’s vendors, impact the Company’s bargaining power relative to other vendors, place the Company at a competitive disadvantage in future contract negotiations, and harm the Company’s relationships with existing and/or prospective vendors and/or customers. In addition, disclosure would give providers of competitive services information useful in making their own marketing and product decisions, without expending the time and money necessary to gather and develop the information. Moreover, disclosure of the confidential information found in the confidential pages could result in the Company paying increased amounts for the same products and services in the future, which would increase costs for the Company and its customers. In addition, public disclosure of this information may discourage vendors from doing business with the Company, discourage vendors from making confidential disclosures to the Company, and expose the Company to certain liabilities.

¹ HRS § 92F-13(3).

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAI'I

In the Matter of the Application of)	
)	
HAWAIIAN ELECTRIC COMPANY, INC.)	Docket No.
)	
For Approval to Construct a 46 kV Overhead)	
Line Pursuant to HRS 269-27.6 (a))	
for the Wahiawa-Waimano 46 kV Overhead)	
Sub-Transmission Line Relocation and to commit)	
funds in excess of \$2,500,000)	
(excluding customer contributions))	
_____)	

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing Application, Verification and Exhibits I-X, together with this Certificate of Service, and duly served on the following party, by electronic mail service as set forth below:

Division of Consumer Advocacy
Department of Commerce and Consumer Affairs
335 Merchant Street, Room 326
Honolulu, Hawai'i 96813
dnishina@dcca.hawaii.gov
consumeradvocate@dcca.hawaii.gov

DATED: Honolulu, Hawai'i, July 11, 2022.

/s/ Richard VanDrunen _____

Richard VanDrunen

HAWAIIAN ELECTRIC COMPANY, INC.
Regulatory Affairs