

BEFORE THE PUBLIC UTILITIES COMMISSION **FILED**

OF THE STATE OF HAWAI'I

2018 MAR 23 P 3:37

PUBLIC UTILITIES
COMMISSION

In the Matter of the Application of)
)
HAWAIIAN ELECTRIC COMPANY, INC.)
)
For Approval to Commit Funds in Excess of)
\$2,500,000 (excluding customer contributions))
for the P0004085 – AES-CEIP 1 138 kV)
Overhead Transmission Line Relocation Project.)
_____)

Docket No.

2018-0068

HAWAIIAN ELECTRIC APPLICATION

VERIFICATION

EXHIBITS I-VII

and

CERTIFICATE OF SERVICE

Joseph P. Viola
Vice President
Regulatory Affairs
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawai'i 96840

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

In the Matter of the Application of)
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HAWAIIAN ELECTRIC COMPANY, INC.) Docket No.
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For Approval to Commit Funds in Excess of)
\$2,500,000 (excluding customer contributions))
for the P0004085 – AES-CEIP 1 138 kV)
Overhead Transmission Line Relocation Project.)
_____)

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: (1) Commission approval in accordance with the provisions of Paragraph 2.3(g)(2) of the Commission’s General Order No. 7 (“G.O. 7”), as revised in Decision and Order No. 21002, issued May 27, 2004 in Docket No. 03-0257 (“D&O 21002”), to commit funds in excess of \$2,500,000 (currently estimated at \$4,227,485) for the P0004085 –AES-CEIP 1 138 kilovolt (“kV”) and 46 kV Overhead Transmission Line Relocation Project (the “Project”); and (2) a Commission determination that the 138 kV and 46 kV line relocations, as described later in this Application, be constructed above the surface of the ground, pursuant to Hawai‘i Revised Statutes (“HRS”) § 269-27.6.

EXECUTIVE SUMMARY

Hawaiian Electric’s 138 kV transmission and 46 kV sub-transmission systems are an interconnected network of high voltage electrical circuits and substations that span much of O‘ahu, and are critical links in the provision of reliable service to customers. The AES-CEIP 1

138 kV transmission line connects the AES 138 kV switching station to the CEIP 138 kV substation, providing a critical path for bulk transmission of power to the grid and ultimately to Hawaiian Electric customers throughout O'ahu from existing independent power producers AES, H-Power, and Kalaeloa, as well as from Hawaiian Electric's CIP CT-1 generating unit.

The AES-CEIP 1 138 kV transmission line is a critical component of the transmission system that connects the northern and southern transmission corridors, transmitting bulk energy from the generating stations in the west to the central and eastern loads of O'ahu. This transmission line also provides redundant networked transmission capacity to provide seamless continuation of power transmission for contingencies, such as outages of other transmission lines. With redundancy, power traveling through a transmission line that is de-energized for maintenance or that unexpectedly trips out of service can immediately flow along an alternative path and customers would not experience any interruption in service.

In 1990, when the AES-CEIP 1 138 kV transmission line was required, the landowner was not firm on their development plans. Therefore, in the easement negotiations with the landowner, it was agreed that Hawaiian Electric would relocate (one time at its expense) the section of the 138 kV overhead line, with an underbuilt 46 kV sub-transmission line, that would conflict with their future development plans.

A portion of the Kahe-Standard Oil 1 46 kV sub-transmission line is underbuilt on the existing AES-CEIP 1 138 kV steel and wood poles. Therefore, in addition to relocating the AES-CEIP 1 138 kV transmission line, the Kahe-Standard Oil 1 46 kV sub-transmission line will also be relocated and underbuilt on the new AES-CEIP 1 138 kV steel poles.

As a result of these easement terms, Hawaiian Electric plans to relocate approximately 5,940 circuit feet of the AES-CEIP 1 138 kV transmission line and 4,100 circuit feet of the

Kahe-Standard Oil 1 46 kV sub-transmission line, approximately 450 feet east, in parallel with its current location. The relocation will include: (1) the installation of twelve new 138 kV self-supporting steel poles; (2) the installation of a new section of shield wire, 138 kV, and 46 kV overhead conductors; and (3) the removal of seventeen existing 138 kV wood poles, two existing 138 kV steel poles and an existing section of shield wire, 138 kV, and 46 kV overhead conductors between the existing AES and CEIP transmission substations. (See Exhibit I for the Project location.)

I

APPLICANT

Hawaiian Electric, whose principal place of business and whose executive offices are located at 900 Richards Street, Honolulu, Hawai‘i, 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:

Daniel G. Brown
Manager, Regulatory Non-Rate Proceedings
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawai‘i 96840-0001

III

EXHIBITS

The following exhibits are provided in support of this Application:

- Exhibit I – Project Location Map
- Exhibit II – 138 kV and 46 kV Circuits
- Exhibit III – Project Area Photographs
- Exhibit IV – Grant of Easement R/W 1989-45
- Exhibit V – Kapolei Properties Request Letter
- Exhibit VI – Hawaiian Electric Proposal Letter
- Exhibit VII – HRS § 269-27.6, Overhead or Underground Considerations

IV

REQUESTED APPROVALS

A. General Order No. 7 – Capital Expenditures

Hawaiian Electric requests Commission approval to commit funds in excess of \$2,500,000, excluding customer contributions, for the purchase, installation and construction of the Project. The Project has a total estimated cost of \$4,227,485, and the request to the Commission is made in accordance with the provisions of Paragraph 2.3(g)(2) of G.O. 7, as revised,¹ which provides in part that, “Proposed capital expenditures . . . in excess of [\$2,500,000] . . . shall be submitted to the Commission for review at least 60 days prior to the commencement of construction or commitment for expenditure, whichever is earlier.”

¹ Pursuant to D&O 21002, effective July 1, 2004, the G.O. 7 capital expenditures threshold was increased from \$500,000 to \$2.5 million, excluding customer contributions. The capital cost of the subject Project is greater than \$2.5 million (excluding customer contributions); therefore, Commission approval of the capital expenditures is required.

B. HRS § 269-27.6 – Construction of 138 kV and 46 kV Lines

Hawaiian Electric also requests a determination by the Commission that the proposed 138 kV and 46 kV line relocations be constructed above the surface of the ground pursuant to HRS § 269-27.6, which provides that:²

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:

(b) In making the determination set forth in subsection (a), for new 138 kilovolt or greater high-voltage transmission systems, the public utilities commission shall evaluate and make specific findings on all of the following factors:

- (1) The amortized cost of construction over the respective usable life of an above-ground versus underground system;
- (2) The amortized cost of repair over the respective usable life of an above-ground versus underground system;
- (3) The risk of damage or destruction over the respective usable life of an above-ground versus underground system;
- (4) The relative safety and liability risks of an above-ground versus underground system;
- (5) The electromagnetic field emission exposure from an above-ground

² See Exhibit VII for a detailed discussion of each of the considerations set forth in HRS § 269.27.6.

- versus underground system;
- (6) The proximity and visibility of an above-ground system to:
 - (A) High density population areas;
 - (B) Conservation and other valuable natural resource and public recreation areas;
 - (C) Areas of special importance to the tourism industry; and
 - (D) Other industries particularly dependent on Hawai'i's natural beauty;
 - (7) The length of the system;
 - (8) The breadth and depth of public sentiment with respect to an above-ground versus underground system; and
 - (9) Any other factors that the public utilities commission deems relevant.

(c) A public utility making an application to the public utilities commission under this section shall clearly and fully state and support its evaluation of each factor set forth in subsection (b).

C. HRS § 269-27.5 – Public Hearing

It is Hawaiian Electric's position that a public hearing pursuant to HRS § 269-27.5 is not required for this Project. HRS § 269-27.5 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.

A public hearing pursuant to HRS § 269-27.5 is not required, as there are no existing homes in the Project area.³ The nearest existing homes are more than 3,300 feet away. (The closest townhomes are in Ko Olina Fairways and the closest homes are in the Honokai Hale and Makakilo areas.) The Project area is zoned I-2 (Industrial – Intensive) and IMX-1 (Industrial – Commercial Mixed Use). In addition, the impact, visual or otherwise, to the existing nearby

³ See Exhibit I for the Project location.

townhomes and homes should be minimal as there are existing 138 kV and 46 kV overhead transmission lines in the Project area.⁴

Further, in Docket No. 2016-0439 (AES-CEIP 2 138 kV Overhead Transmission Line Relocation), the Commission found that based on Hawaiian Electric's representations, the public hearing requirement, as set forth under HRS § 269-27.5, has not been triggered as the proposed transmission lines will not pass through any residential area. The section of 138 kV and 46 kV lines proposed to be relocated in the subject Project is just west of the project that was the subject of Docket No. 2016-0439, and as such, no public hearing should be necessary. However, should the Commission determine that a public hearing is necessary pursuant to HRS § 269-27.5, Hawaiian Electric requests that the Commission schedule a public hearing.

V

COST ESTIMATE

The subject Project has a total estimated cost of \$4,227,485⁵, excluding customer contributions. Commission approval pursuant to G.O. 7 Paragraph 2.3(g)(2), as modified by D&O 21002, is being requested as the estimated capital expenditure is in excess of \$2,500,000, excluding customer contributions.

VI

PROJECT DESCRIPTION

The proposed scope for this Project includes: (1) the installation of twelve new 138 kV self-supporting steel poles; (2) the installation of a new section of shield wire, 138 kV, and 46 kV overhead conductors; (3) the removal of seventeen existing 138 kV wood poles; (4) the

⁴ See Exhibit II for the existing and relocated 138 kV and 46 kV lines; see Exhibit III for digital photographs of the Project area.

⁵ See Exhibit VII Attachment 1 for the Project cost.

removal of two existing 138 kV steel poles; and (5) the removal of an existing section of shield wire, 138 kV, and 46 kV overhead conductors between the existing AES and CEIP transmission substations.

This Project, at the request of the current landowner, Kapolei Properties (“KPD” or the “Landowner”), involves the relocation of eighteen spans of the AES-CEIP 1 138 kV overhead transmission line from existing steel pole P10 to existing wood pole P36 and twelve spans of the Kahe-Standard Oil 1 46 kV sub-transmission line from existing steel pole P10 to existing wood pole P30, located between the AES and CEIP substations. The overhead electrical work will consist of installing twelve new, self-supporting, steel poles to support the shield wire, 138 kV, and 46 kV overhead conductors. The materials to be installed are twelve, 115 to 125-foot tall, steel poles, approximately 5,400 linear feet of shield wire, approximately 5,400 circuit feet of 1780 KCM ACSS/AW/TW (aluminum conductor steel supported/alumoweld/trapezoidal) 138 kV overhead conductors, and approximately 4,800 circuit feet of 556.4 KCM AAC (all aluminum conductor) 46 kV overhead conductors. The pole configurations of the existing and proposed poles will be the same. The removal process will involve the removal of seventeen, 100 to 125-foot, 138 kV wood poles, two, 115-foot, 138 kV steel poles, approximately 5,940 linear feet of shield wire, approximately 5,940 circuit feet of 138 kV overhead conductors, and approximately 4,100 circuit feet of 46 kV overhead conductors.

VII

PROJECT JUSTIFICATION

In 1990, when the AES-CEIP 1 138 kV overhead transmission line was required, the Landowner was not firm on their development plans. Therefore, in the easement negotiations

with the Landowner, it was agreed that Hawaiian Electric would relocate (one time at its expense) the section of the 138 kV overhead line, with an underbuilt 46 kV sub-transmission line, that would conflict with their future development plans.

In accordance with a Grant of Easement, dated June 25, 1991,⁶ by and among Hawaiian Electric and the Landowner, for the original AES-CEIP 1 138 kV overhead transmission line installation,⁷ Hawaiian Electric agreed to a one-time relocation of a portion (approximately 1.1 miles) of its 138 kV overhead transmission line, with an underbuilt 46 kV sub-transmission line, between the AES and CEIP substations from its current easement to a new permanent perpetual easement at the time of request by the Landowner. KPD, the current Landowner, formally requested by letter, dated June 7, 2017,⁸ that Hawaiian Electric commence with the relocation of its 138 kV and 46 kV overhead lines. Subsequent to KPD's request letter, Hawaiian Electric commenced with preliminary engineering design, working closely with KPD, to identify the preferred permanent alignment for the 138 kV and 46 kV overhead lines.

The preferred permanent alignment will run adjacent and parallel (on the west side) to a new drainage channel. Hawaiian Electric and KPD have an executed proposal letter, dated August 25, 2017,⁹ for this work. Hawaiian Electric will be responsible for 100% of the Project cost.

VIII

138 KV AND 46 KV LINES

HRS § 269-27.6 provides that whenever a public utility applies for approval to build a new 46 kV or greater transmission line, "either above or below the surface of the ground," the

⁶ See Exhibit IV for Grant of Easement R/W 1989-45 dated June 25, 1991.

⁷ See Docket No. 6459 Construction of Kalaeloa Units 2 & 3 Interconnection dated June 15, 1989.

⁸ See Exhibit V for KPD Request Letter dated June 7, 2017.

⁹ See Exhibit VI for Hawaiian Electric Proposal Letter dated April 25, 2017.

Commission shall determine whether the line shall be “built above or below the surface of the ground” As a result, Hawaiian Electric requests that the Commission determine that the proposed section of 138 kV and 46 kV transmission lines be constructed above the surface of the ground, as described in Section VI of this Application.

Hawaiian Electric considered a number of factors, including the guidelines set forth in HRS § 269-27.6, in concluding that the relocated 138 kV and 46 kV lines should be constructed overhead. The route of the proposed relocated AES-CEIP 1 138 kV line with 46 kV line underbuild, resulting from the relocation of existing steel poles P10 to P11 and existing wood poles P20 to P36, does not change the location of the line significantly. The relocated section of line will shift approximately 450 feet east in parallel from its current location. The relocation decreases the circuit length by approximately 540 feet, and places the new poles alongside a new drainage channel where the line can be safely and cost-effectively installed and maintained. The relocated line will traverse through areas zoned Industrial – Intensive (I-2) and Industrial – Commercial Mixed Use (IMX-1).

Attached as Exhibit VII is Hawaiian Electric’s review of the factors stated in HRS § 269-27.6 in determining whether the relocated sections should be placed, constructed, erected, or built above or below the surface of the ground.

IX

SCHEDULE

The construction of Hawaiian Electric’s facilities for the Project is expected to start in September 2019 and be completed by December 2019. Hawaiian Electric plans to order the long lead-time materials (e.g., steel poles) by May 2019 in order to start construction in September 2019.

NON-TRANSMISSION ALTERNATIVES

Attached as Exhibit A to Decision and Order No. 32052, filed April 28, 2014 in Docket No. 2012-0036 (Regarding Integrated Resource Planning) is the “*Commission’s Inclinations on the Future of Hawaii’s Electric Utilities*”. Included in the exhibit is the following Commission guidance with regard to transmission planning and the future development of new transmission projects on Hawai‘i’s grids:

New transmission projects must consider non-transmission alternatives – New, replacement or upgrade high-voltage transmission projects generally represent significant, lumpy capital investments that will be given careful scrutiny. Non-transmission alternatives (NTAs) such as local peaking or back-up generators, energy storage, demand response and smart grid resources are technically and commercially available alternatives that must be evaluated as part of any economic justification for new transmission system projects.

The subject Project involves the relocation of eighteen spans of the AES-CEIP 1 138 kV transmission line and twelve spans of the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line to facilitate the Kapolei Harborside development, i.e., approximately 5,940 circuit feet out of 2.2 miles and 4,100 circuit feet out of 7.0 miles, respectively. This Project does not involve the rebuilding of the existing 138 kV and 46 kV lines, nor the construction of a new 138 kV and 46 kV line. In this case, the non-transmission alternatives (“NTAs”) such as new generation, energy storage, demand response or smart grid resources are likely to be more costly than the proposed relocation of the short section of 138 kV and 46 kV lines. However, the Company did not conduct or document explicit analyses, cost estimates or projected schedules in support of its evaluation of NTAs.

Similar to Docket No. 2014-0149,¹⁰ involving the relocation of a small section of a much larger transmission line, the existing 138 kV line is necessary for the bulk delivery of power for the Hawaiian Electric system. In the instance in Docket No. 2014-0149, as in this case, the comparison of NTAs such as energy storage, demand response or smart grid resources versus the proposed transmission line relocation was less a matter of cost, and more related to the fact that NTAs are simply inappropriate for replacing the functionality of a segment of a large transmission line.¹¹ The Company does not recommend removing this section of 138 kV and 46 kV lines in lieu of the proposed relocation. Therefore, the Company requests that the evaluation of NTAs required for transmission projects be waived in this instance.

XI

COST RECOVERY

Upon placement of the Project into service, Hawaiian Electric plans to include the Project investment in its Decoupling Rate Adjustment Mechanism ("RAM") Revenue Adjustment (under the existing RAM tariff conditions, subject to the RAM cap), and thereafter, will include the Project costs in rate base in its next rate case application.

¹⁰ See Docket No. 2014-0149 (Halawa-Makalapa P11H and P12H Replacements), Application filed June 23, 2014 at 9-10; see also Company's response to CA-IR-4, filed December 5, 2014 in Docket No. 2014-0149.

¹¹ In Docket No. 2014-0149, the viable non-transmission alternative to relocating the transmission line segment was to remove the transmission line segment and install generating stations at each end of the missing segment. The displacement of the transmission line segment with two firm-power generating stations proved to be a substantially more costly option.

XII

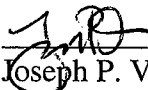
CONCLUSION

Wherefore, Hawaiian Electric respectfully requests that the Commission:

- (1) Approve the commitment of funds in excess of \$2,500,000 for the Project (currently estimated at \$4,227,485), in accordance with Paragraph 2.3(g)(2) of G.O. 7 (as amended by D&O 21002);
- (2) Determine that the proposed 138 kV and 46 kV line relocations be constructed above the surface of the ground, pursuant to HRS § 269-27.6; and
- (3) Grant Hawaiian Electric such other and further relief as may be just and equitable in the premises.

DATED: Honolulu, Hawai'i March 23, 2018

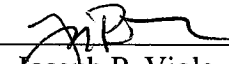
HAWAIIAN ELECTRIC COMPANY, INC.

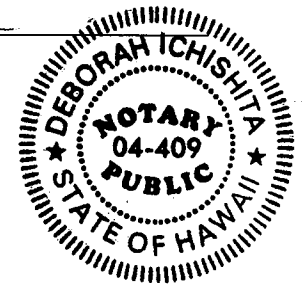
By  _____
Joseph P. Viola
Vice President
Regulatory Affairs

VERIFICATION

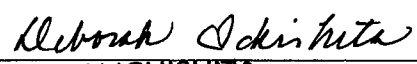
STATE OF HAWAI'I)
) ss.
CITY AND COUNTY OF HONOLULU)

JOSEPH P. VIOLA, being first duly sworn, deposes and says: That he is the Vice President – Regulatory Affairs of Hawaiian Electric Company, Inc. (“Hawaiian Electric”), Applicant in the above proceeding; that he makes this verification for and on behalf of Hawaiian Electric and is authorized so to do; that he has read the foregoing Application, and knows the contents thereof; and that the same are true of his own knowledge except as to matters stated on information or belief, and that as to those matters he believes them to be true.

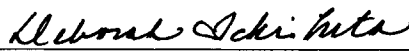

Joseph P. Viola

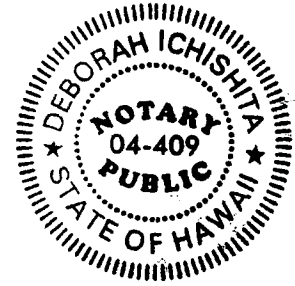


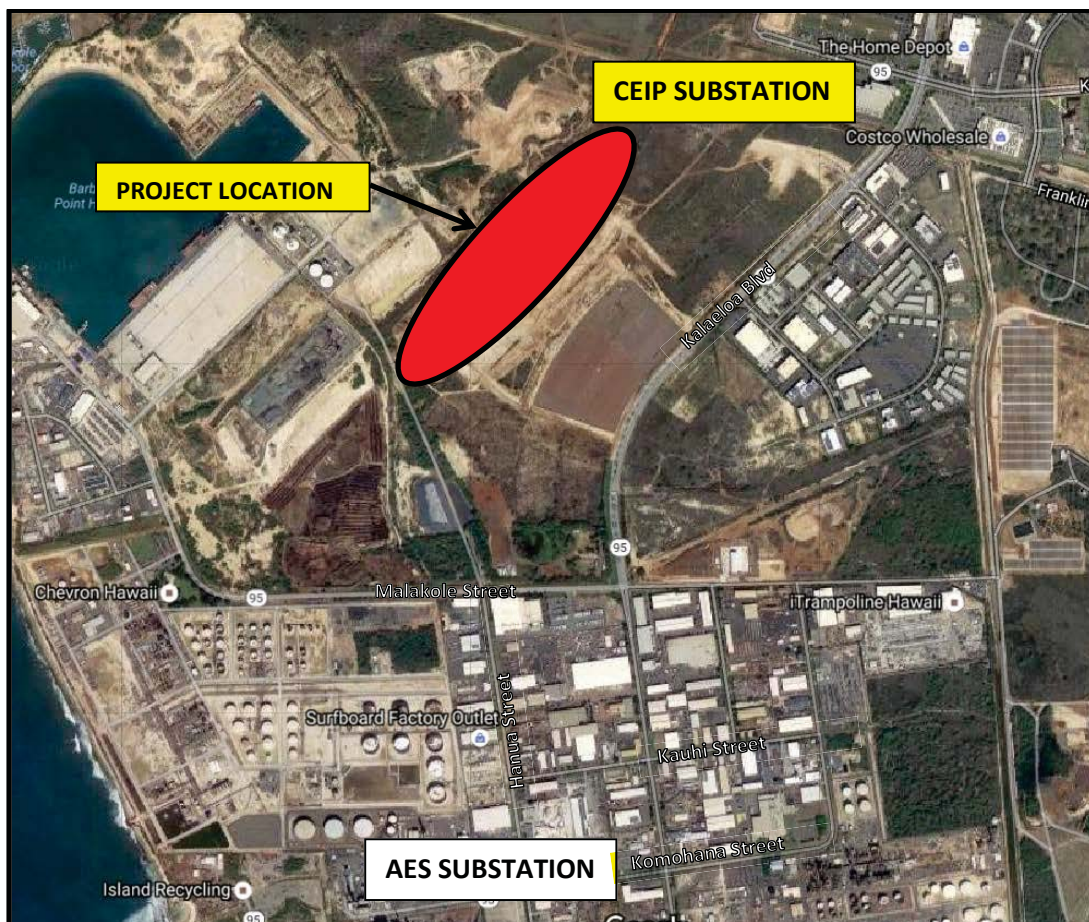
Subscribed and sworn to before
me this 23rd day of March, 2018.

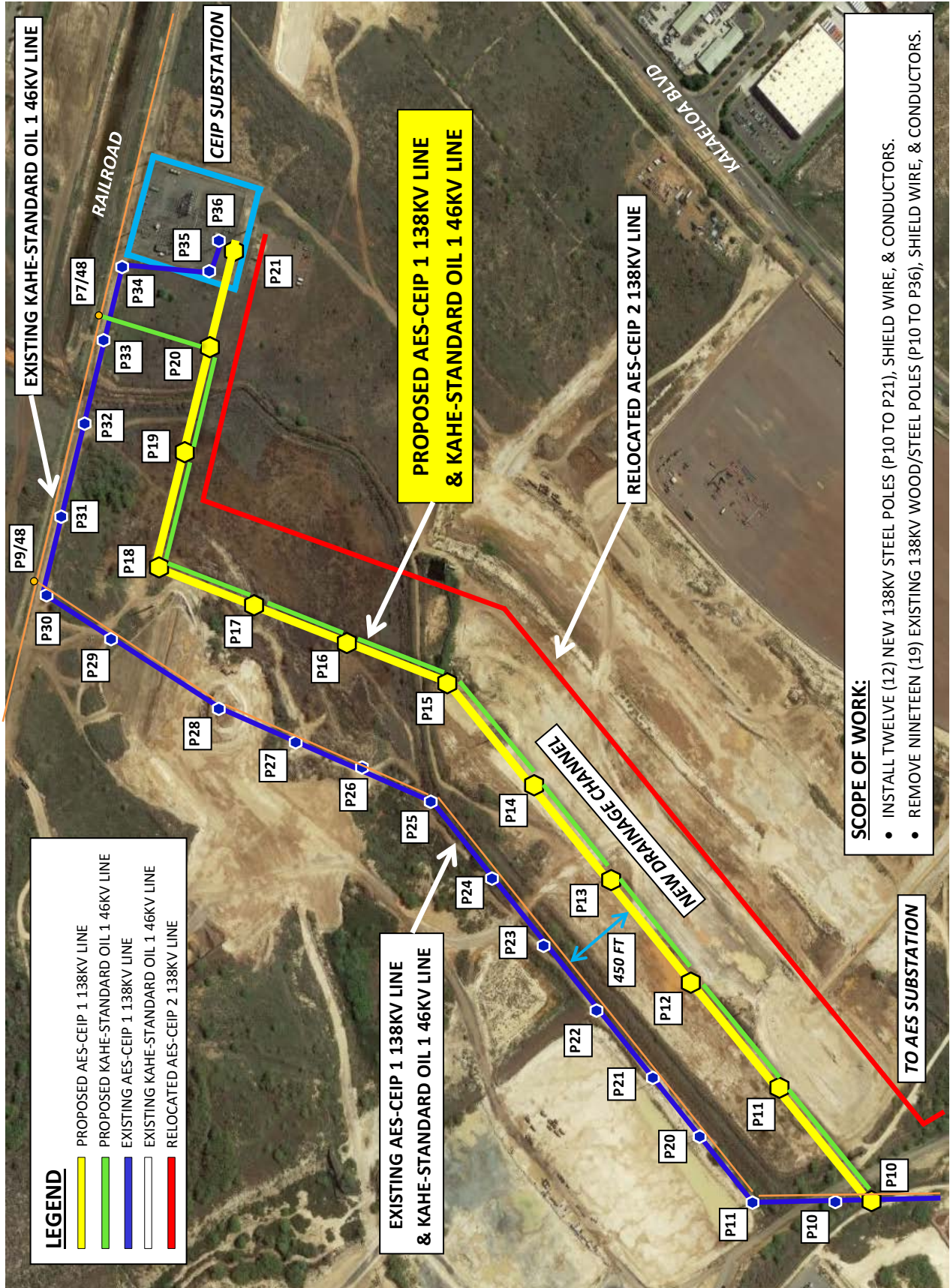

DEBORAH ICHISHITA
Notary Public, First Circuit,
State of Hawai‘i

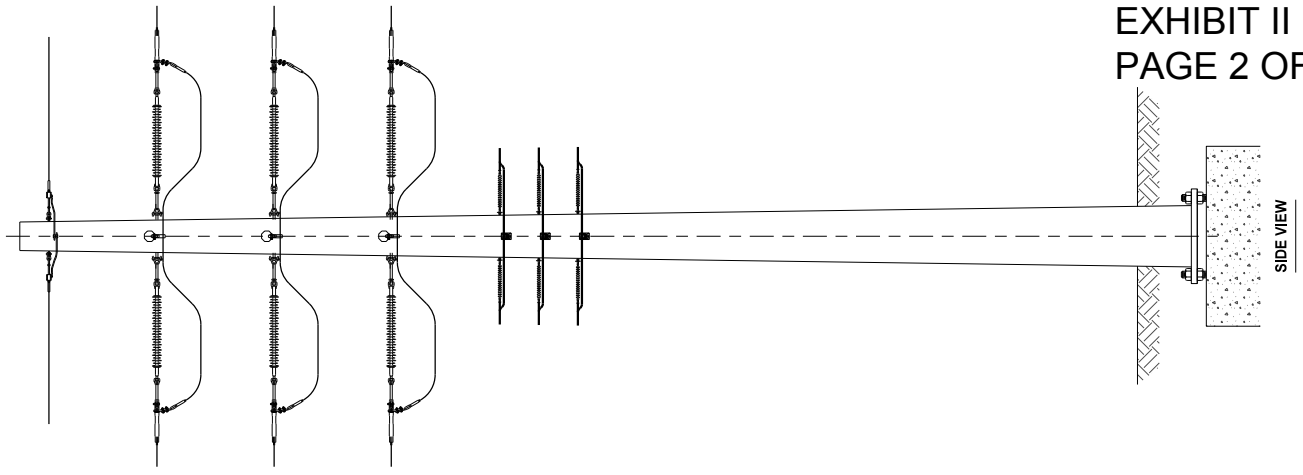
My Commission expires July 18, 2020

STATE OF HAWAI‘I NOTARY CERTIFICATION	
Doc. Date: <u>3/23/2018</u>	# of pages <u>83</u>
Notary Name: DEBORAH ICHISHITA First Circuit	
Doc. Description: <u>Hawaiian Electric Application,</u> <u>Verification, Exhibits I-VII</u>	
 Notary Signature	<u>3/23/18</u> Date

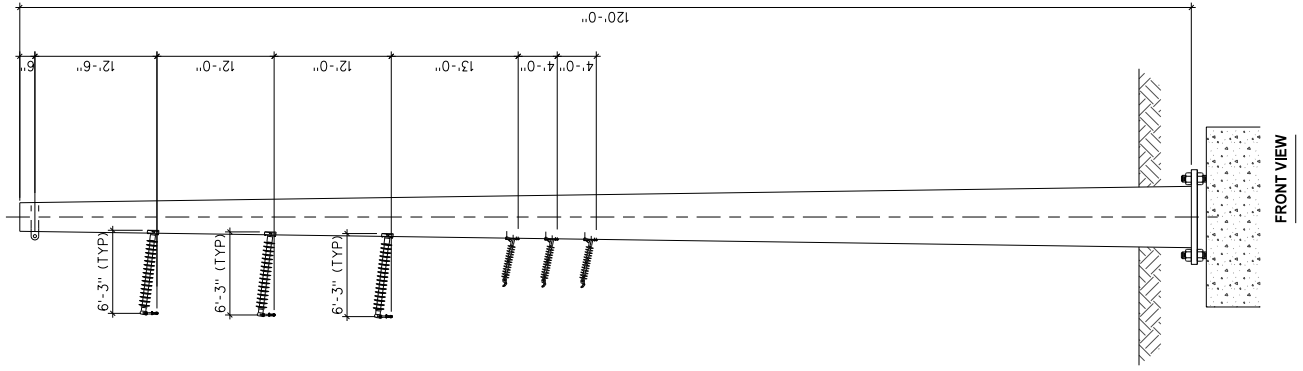




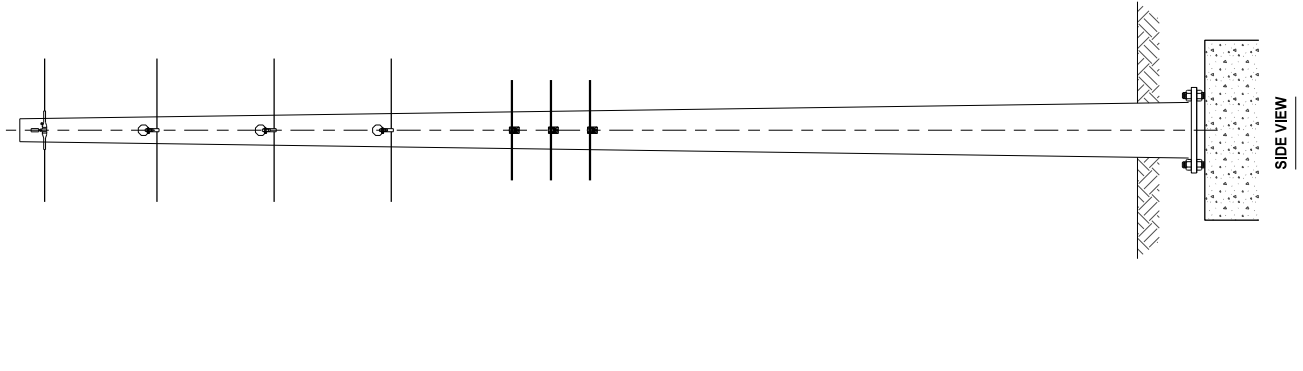




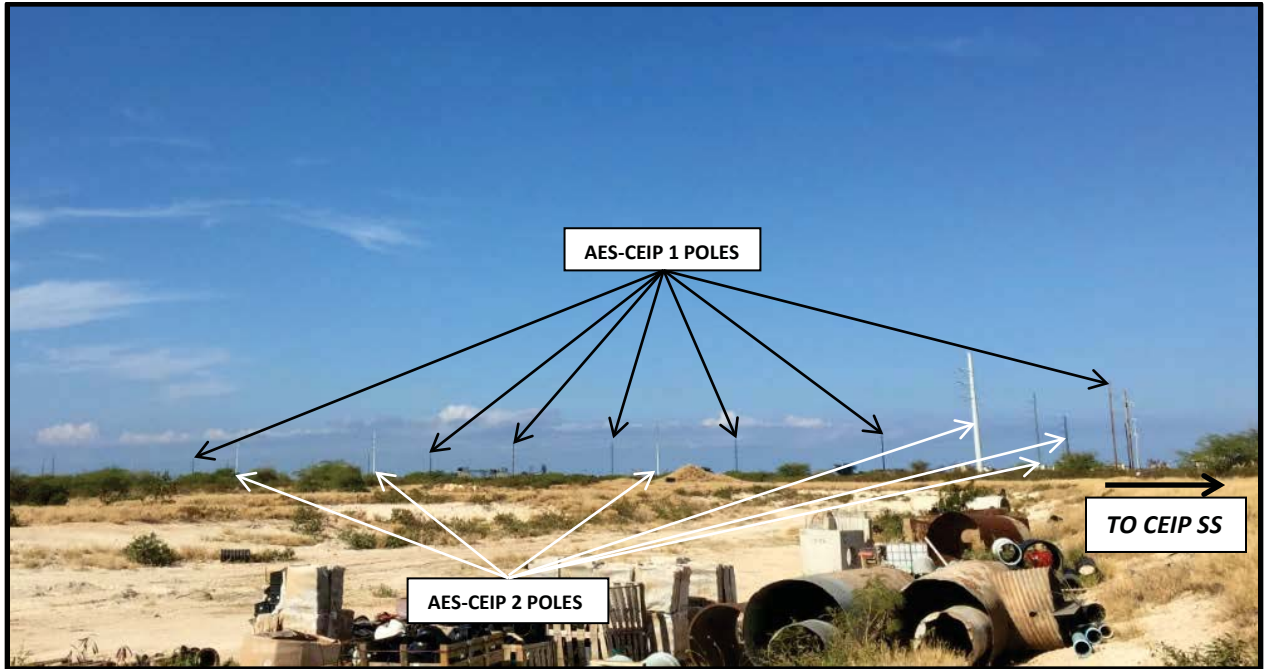
120' 138KV DEADEND STEEL POLE



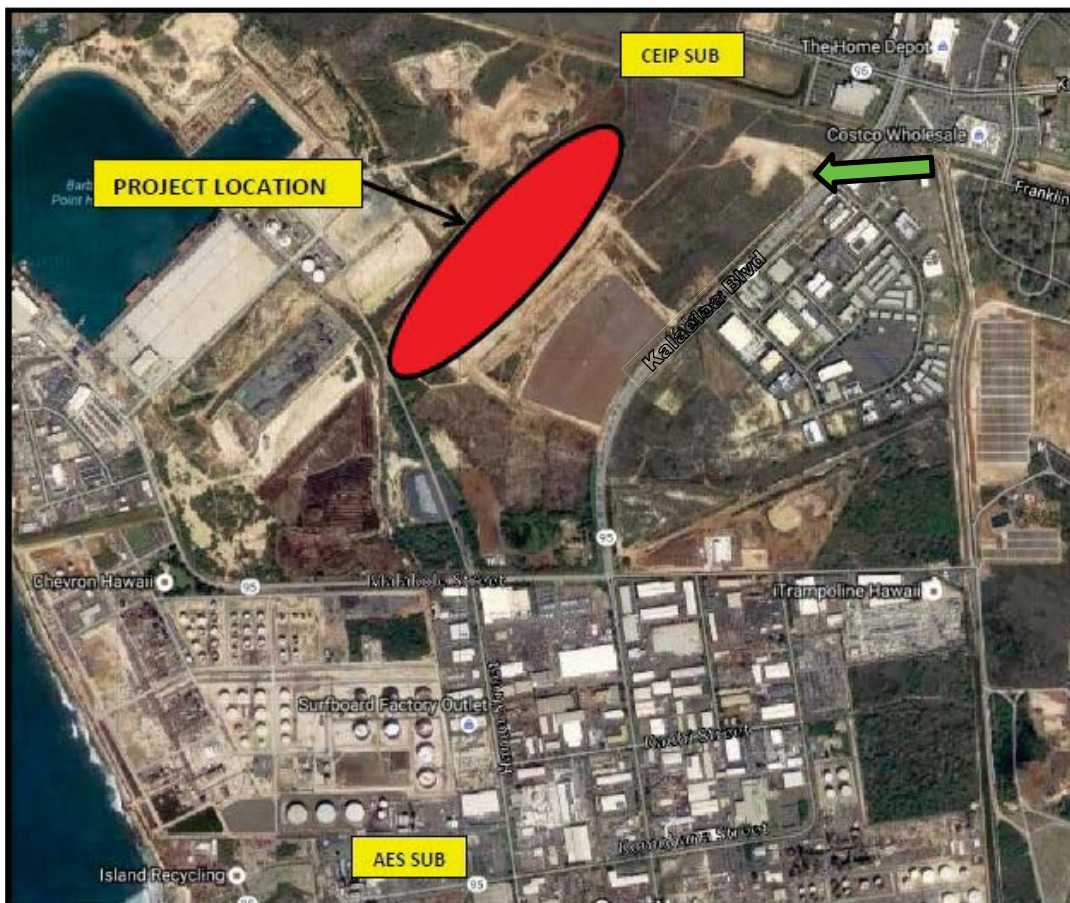
120' 138KV TANGENT STEEL POLE



120' 138KV TANGENT STEEL POLES

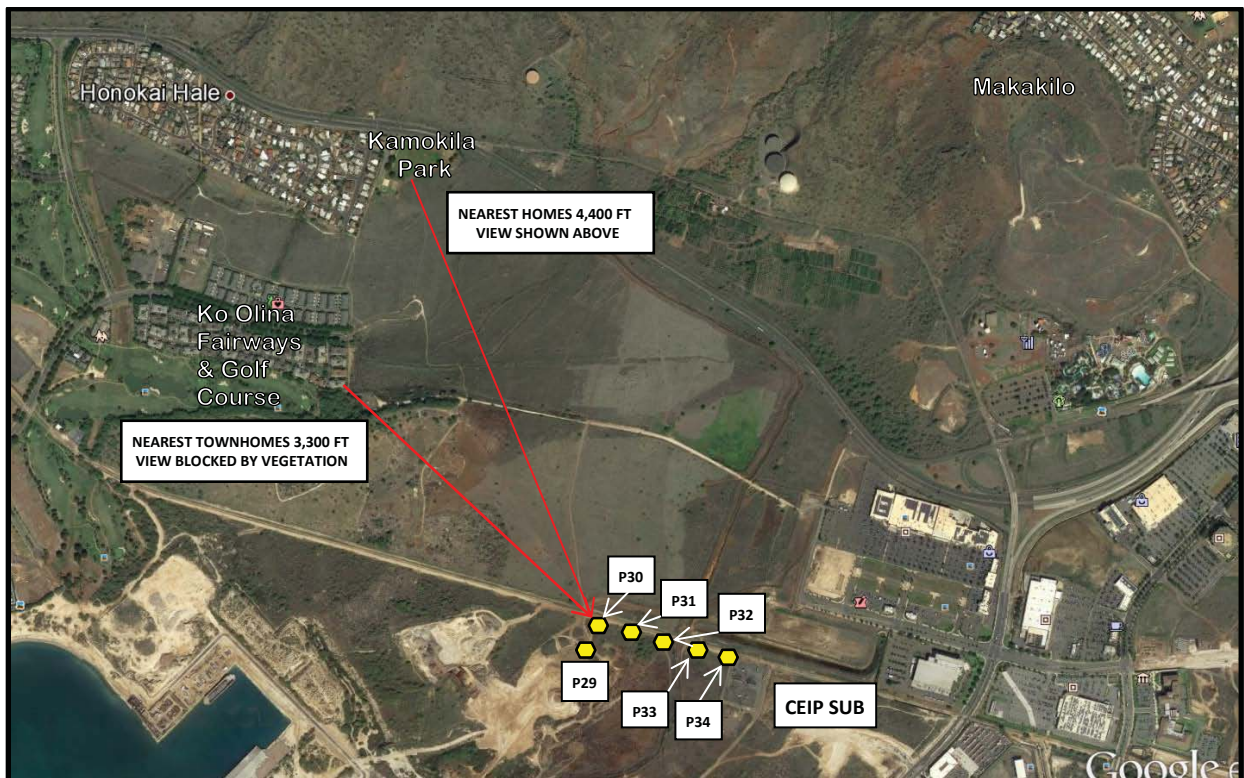


View from Kalaeloa Boulevard.



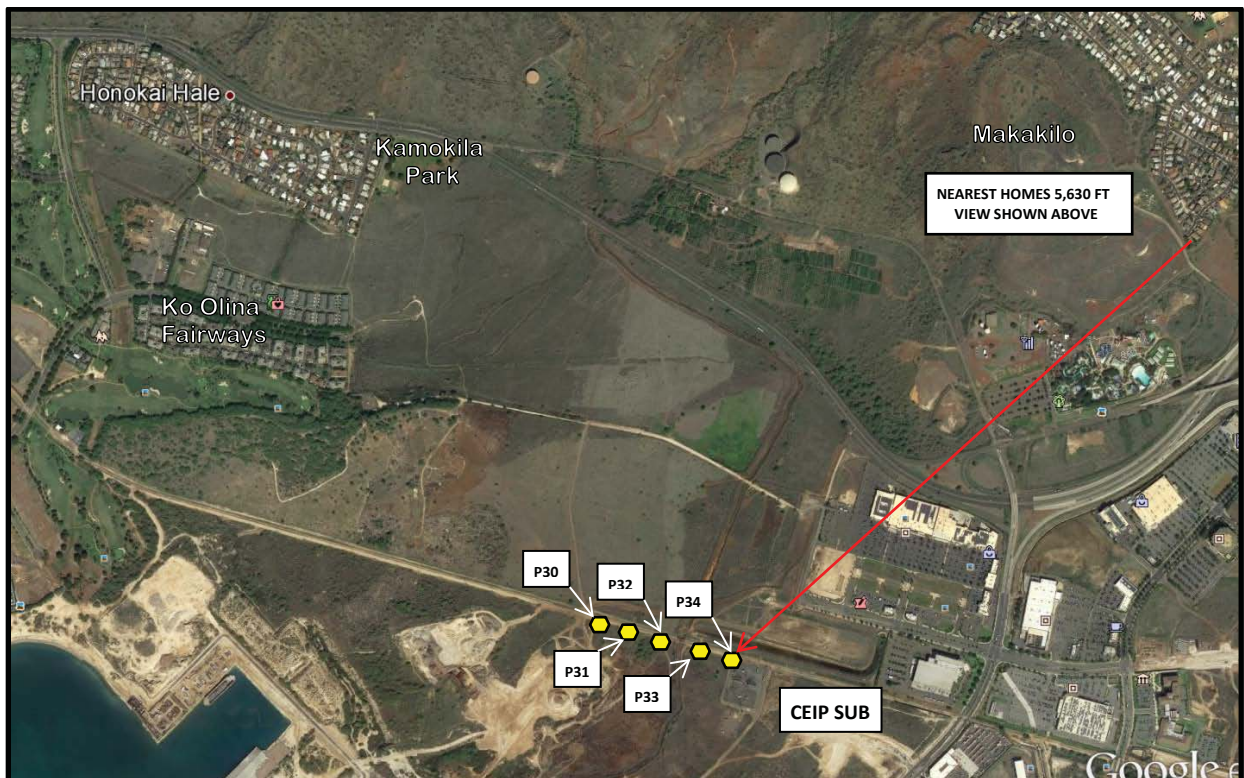


View from Honokai Hale/Kamokila Community Park to Project Site.



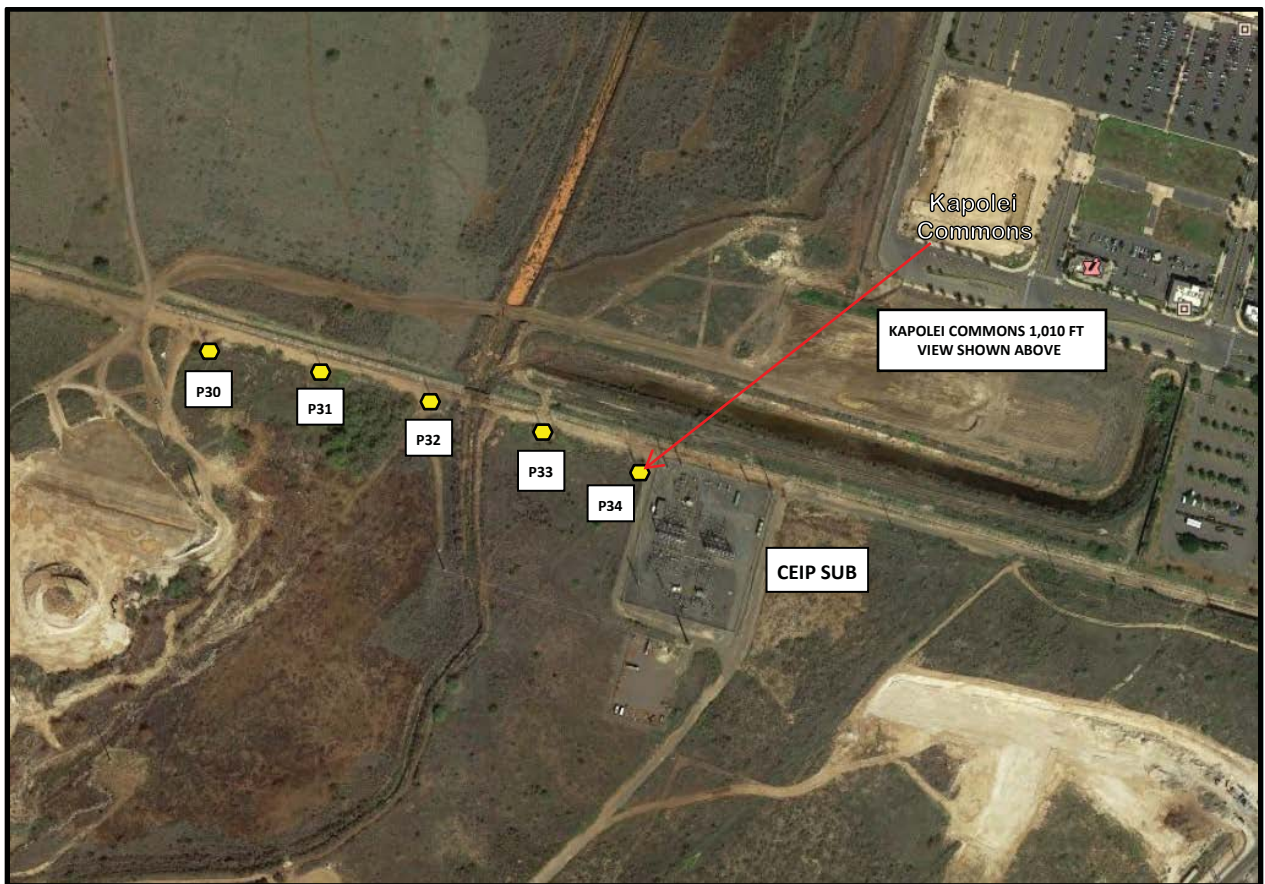


View from Makakilo to Project Site.





View from Kapolei Commons to Project Site.



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OFFICE OF THE REGISTER

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LAND COURT SYSTEM

REGULAR SYSTEM

AFTER RECORDATION, RETURN BY MAIL PICKUP

HAWAIIAN ELECTRIC COMPANY, INC.
HONOLULU, HAWAII

[DO NOT WRITE IN THIS SPACE]

TITLE OF DOCUMENT:
Easement No. E00787600
GRANT OF EASEMENT

PARTIES TO DOCUMENT:

Grantor: TRUSTEES UNDER THE WILL AND OF THE ESTATE OF JAMES CAMPBELL, DECEASED

Grantee: HAWAIIAN ELECTRIC COMPANY, INC.

PROPERTY DESCRIPTION:	:	LIBER/PAGE:
LOT 172-A-1, Map 275; LOT 3158,	:	DOCUMENT NO.:
Map 322; and LOT 4021, Map 404,	:	TRANSFER CERTIFICATE OF
all of Ld. Ct. Appl. 1069	:	TITLE NO(S).: 15,790, 233,909
	:	and 289,471

GLW 101889 8880N

R/W 89-45

GRANT OF EASEMENT

THIS INSTRUMENT made this _____ day of _____, 19____, by and between TRUSTEES UNDER THE WILL AND OF THE ESTATE OF JAMES CAMPBELL, DECEASED, acting in their fiduciary and not in their individual capacities, hereinafter referred to as the "Grantors", and HAWAIIAN ELECTRIC COMPANY, INC., a Hawaii corporation, whose principal place of business and post office address is 900 Richards Street, Honolulu, Hawaii, hereinafter referred to as the "Grantee",

W I T N E S S E T H T H A T:

The Grantors, in consideration of the sum of Ten Dollars (\$10.00) paid to the Grantors, the receipt of which is acknowledged, and of the covenants herein made by the Grantee, grants and conveys unto the Grantee a perpetual right and easement to construct, reconstruct, operate, maintain, repair and remove pole and wire lines, guy wires and anchors, and/or underground power lines and such other appliances and equipment as may be necessary for the transmission and distribution of electricity to be used for light and power and/or communications and control circuits, including, without limiting the generality of the foregoing, the right to trim and keep trimmed any trees in the way of its lines, appliances and equipment and the right of entry upon the Grantors' land for the aforesaid purposes, over, under, upon, across and through those certain premises located off Malakole Road, at Honouliuli, Ewa, Oahu, Hawaii, the easement for pole and wire lines, guy wires and anchors and/or underground power lines being within Lots 172-A-1 (Map 275), 3158 (Map 322), and 4021 (Map 404), of Land Court Application 1069, covered by Certificates of Title Nos. 15,790/(Lot 172-A-1), 233,909/(Lot 3158, and 289,471/(Lot 4021), the easement being one hundred (100) feet wide, extending fifty (50) feet on each side of the center line with an area of 15.288 acres, and the easement for pole and wire lines, guy wires and anchors and/or underground power lines within said Lot 172-A-1 being sixty (60) feet wide, running contiguous and parallel along the west boundary of Lot 172-A-2 (Map 275), containing an area of 21,600 square feet, located as shown on Map 89-45 attached hereto, and including all service lines emanating from the main trunk line.

RESERVING, HOWEVER, unto the Grantors and their tenants and licensees, the right to cultivate and use for all purposes any portions of the granted premises not occupied by the appliances and equipment of the Grantee, including rights of way over, under and across the granted premises, provided, however, that such reserved rights shall be used in a manner that will not unreasonably interfere with the Grantee's lines, and no structure shall be erected on the granted premises over the height of twelve (12) feet above the surface of the ground without the written consent of the Grantee.

TO HAVE AND TO HOLD the same unto the Grantee, its successors and assigns, forever; provided, however, that should any portion or portions of the granted premises be abandoned by the Grantee or remain unused for a period of one (1) year after installation, then all rights hereby granted shall thereupon cease and terminate as to the portion or portions so abandoned or unused.

AND the Grantee, in consideration of the foregoing grant, does hereby covenant and agree with the Grantors that:

1. DUE CARE AND DILIGENCE. The Grantee will use due care and diligence in the construction and operation of its lines and appurtenances, in keeping and maintaining them in good and safe condition and repair, and in the exercise of its rights hereunder, and will at all times exercise its rights hereunder in a manner that will occasion the least possible interference with or interruption of the use of the premises by the Grantors and their tenants or any other occupants.
2. TAXES. The Grantee will pay when and as due all taxes and assessments levied and assessed against the lines and appurtenances or the easement hereby granted, whether assessed to or payable by the Grantors or Grantee, but this covenant shall not require the payment of taxes or assessments levied against any land subject to this easement.
3. PLACEMENT OF LINES. The Grantee will place and maintain the wires of its lines so that the clearance of the wires, conduits and appurtenances will be in accordance with rules established by the Public Utilities Commission of the State of Hawaii.
4. LOCATION OF LINES. The Grantee will not without the prior written consent of the Grantors, which consent shall not be unreasonably or capriciously withheld, construct or place any poles or other structures on the granted premises except in the approximate locations shown on the attached map.
5. DAMAGE TO CROPS. The Grantee will reimburse the Grantors, their tenants and any other permitted occupants for any and all damage or injury to their crops and other property caused by, sustained or resulting from the construction or maintenance of its lines and appurtenances or other exercise of its rights hereunder.
6. INDEMNITY. The Grantee will indemnify and hold harmless the Grantors, their tenants and all persons occupying the premises or land immediately adjacent thereto, either under lease from or by permission of the Grantors, from any and all claims and demands against them or any of them for loss or damage or injury to persons or property, including the claims of their respective agents and employees, arising out of the use or occupation of the granted premises and the construction, maintenance, operation or removal of the lines and appurtenances not caused by the negligence of the party to be indemnified or their agents or employees 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.
7. ASSIGNMENT. The Grantee will not without the prior written consent of the Grantors assign or mortgage this grant or sublet or part with the control of the easement or interest therein or rights hereby granted or any part thereof, provided, however, that without such consent this grant may be assigned as security to Hawaiian Trust Company, Limited, Trustee for the Bondholders of the Grantee, and may be assigned by the Trustee upon foreclosure to a purchaser thereof.

8. RESTORATION OF SURFACE. After construction or repair or removal of the lines and appurtenances, the Grantee will restore the surface of the land as nearly as is reasonably possible to the condition existing immediately prior thereto.

9. REMOVAL. The Grantee shall have the right and upon abandonment of the easement it will remove all said poles, wires, guys, equipment and appurtenances from the granted premises and will upon such removal restore the surface of the land as nearly as is reasonably possible to its condition immediately prior to the construction or installation of such improvements, the Grantors hereby consenting to such removal.

10. CLEAR GRANTORS' TITLE. In the event of abandonment of the easement the Grantee will prepare, execute and record at its expense an appropriate instrument evidencing the same.

11. NOTICE OF ENTRY. The Grantee shall give five days' prior notice to the occupants of the land across which this easement passes of its intent to enter upon the land for the purpose of constructing, maintaining, repairing or operating its lines, appliances and equipment, except in the event of an emergency, in which case notice will be given as soon as reasonably possible.

12. RELOCATION. If Lot 172-A-1, Lot 3158 or Lot 4021 or any part thereof shall be subdivided or otherwise developed and the lines shown on attached Map 89-45 shall in any way interfere with such subdivision or development, the Grantee, at its own expense, shall relocate its lines as shown on Map 89-45 only, or such portion or portions thereof as shall interfere, to such substitute easement area or areas as may be granted by the Grantors to the Grantee, or to such public roadways as may be created in the vicinity of the easements hereinabove set forth, and in case of any such relocation the minimum clearance of the wires shall be as hereinabove provided; provided, however, that the Grantee shall not be required to make more than one (1) such relocation of its lines at its own expense.

IT IS HEREBY UNDERSTOOD AND AGREED by and between the parties hereto that:

A. CONDEMNATION. If the premises affected by this right of way and easement shall be taken or condemned in whole or part by any authority having the power of eminent domain, all compensation and damages awarded on account of the condemnation or taking shall be payable to the Grantors, their lessees and tenants, if any, as their interests appear, without any apportionment to the Grantee, except that the Grantee may claim and recover only from the condemning authority full compensation for its lines and equipment and any severance or other damages to its right of way, including the cost of obtaining and relocating to a substitute right of way.

B. LANDSCAPING. The Grantors shall install and maintain or cause to be installed and maintained without expense to the Grantee any screening or landscaping of the Grantee's facilities which may now or hereafter be required by law or governmental agency or regulation and will indemnify the Grantee from all loss and liability arising from the breach of this covenant.

C. LESSEE'S CONSENT. The person or persons who are the lessees under the leases described below (the "Lessee" herein), hereby join in this grant of easement to the extent of their leasehold interests and consent to the construction and maintenance of the Grantee's lines on the terms and conditions set forth herein and agree that their leasehold interests shall be subordinate to this grant of easement:

Lease dated January 22, 1929, recorded in the Bureau of Conveyances of the State of Hawaii in Liber 1155, Page 66, in favor of Ewa Plantation Company, which Lease was assigned to OAHU SUGAR COMPANY, LIMITED, a Hawaii corporation, by instrument dated April 9, 1970, filed as Document No. 500009.

D. CANCELLATION. The Grantors and the Grantee do hereby:

(1) cancel and terminate in its entirety that certain grant of easement dated April 4, 1960, filed as Document No. 256483; and

(2) cancel and terminate in its entirety that certain grant of easement dated June 8, 1961, filed as Document No. 277145.

The Grantors and the Grantee acknowledge that up to the date hereof, each of them has fully performed all the terms and conditions contained in Document Nos. 256483 and 277145, and each releases and discharges the other from all claims whatsoever that each of them has or may have against the other arising in connection with the easements terminated hereby.

E. RELEASE. HAWAIIAN TRUST COMPANY, LIMITED, a Hawaii corporation, Trustee Mortgagee under that certain Mortgage and Deed of Trust made by the Grantee, as Mortgagor, to the the Trustee Mortgagee dated December 1, 1938, filed as Document No. 45945, as amended, hereby consents to the foregoing cancellation and surrender of Document Nos. 256483 and 277145, and releases from the lien of its mortgages and deeds of trust the easements terminated above, the easements having been acquired by the Grantee in the ordinary course of its business, the interests of the Grantee having been assigned to the Trustee Mortgagee by instruments dated April 4, 1960 and June 8, 1961, filed as Document Nos. 256485 and 277147, respectively, such cancellation and release appearing to be in the best interests of the bondholders secured by the mortgages and deeds of trust.

F. PARTIES IN INTEREST. The covenants contained herein shall inure to the benefit of and be binding upon, the parties and their respective heirs, personal representatives, successors in trust and assigns. Whenever the term "Grantee" refers to more than one person, each such person covenants for itself and not for the other.

G. DEFINITIONS. All defined terms (words such as Grantors, Grantee, etc.) and pronouns used in the singular shall mean and include the plural and include the masculine,

feminine or neuter gender, as the context of this grant shall require. The term "person" shall mean an individual, partnership, association, trust, corporation or other entity as the context may require.

IN WITNESS WHEREOF the undersigned have executed this instrument as of the date first above mentioned.

TRUSTEES UNDER THE WILL AND OF THE
ESTATE OF JAMES CAMPBELL, DECEASED,
acting in their fiduciary and not
in their individual capacities

F. E. Trotter

W. H. McVay
W. H. McVay

P. R. Cassidy
P. R. Cassidy

C. D. Pratt, Jr.
C. D. Pratt, Jr.

Grantors

APPROVED	
Legal Form	
CASE & SYNCH	
By <u>James K. Wilson</u>	
Engineering Department:	
Survey	
Division	
Initiating	
Division	
Land & Rights of Ways	
By	

HAWAIIAN ELECTRIC COMPANY, INC.,
a Hawaii corporation

BY [Signature]
Its VICE PRESIDENT

BY [Signature]
Its SECRETARY

Grantee

OAHU SUGAR COMPANY, LIMITED,
a Hawaii corporation

By W.D. Balaban
Its VICE PRESIDENT

By Wm B. Bule
Its ASSISTANT SECRETARY

Lessee

Approved on its Form
P. 111-1-100

HAWAIIAN TRUST COMPANY, LIMITED,
a Hawaii corporation

By [Signature]
Its Assistant Vice President

By [Signature]
Its Assistant Vice President

Trustee Mortgagee

STATE OF HAWAII)
) SS.
CITY AND COUNTY OF HONOLULU)

On this 5th day of April, 1990, before me appeared PETER C. LEWIS and MOLLY M. EGGER, to me personally known, who, being by me duly sworn, did say that they are the VICE PRESIDENT and SECRETARY, respectively, of HAWAIIAN ELECTRIC COMPANY, INC., a Hawaii corporation, 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 said officers acknowledged said instrument to be the free act and deed of said corporation.

James G. Lewis
Notary Public, State of Hawaii
My commission expires: 10/10/90

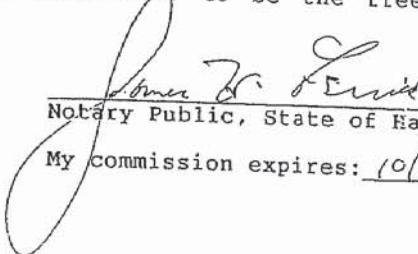
STATE OF HAWAII)
) SS.
CITY AND COUNTY OF HONOLULU)

On this 27th day of March, 1990, before me appeared W.D. BALFOUR, JR. and MICHAEL B. BURKE, 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, a Hawaii corporation, 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 said officers acknowledged said instrument to be the free act and deed of said corporation.

Kristine K. Kim
Notary Public, State of Hawaii
My commission expires: 9-25-92

STATE OF HAWAII)
)
CITY AND COUNTY OF HONOLULU) SS.

On this 6th day of June, 1991, before me appeared R.L. O'CONNELL and MOLLY M. EGGER, to me personally known, who, being by me duly sworn, did say that they are the VICE PRESIDENT and SECRETARY respectively, of HAWAIIAN ELECTRIC COMPANY, INC., a Hawaii corporation, 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 said officers acknowledged said instrument to be the free act and deed of said corporation.



Notary Public, State of Hawaii
My commission expires: 10/15/94

STATE OF HAWAII)
)
CITY AND COUNTY OF HONOLULU) SS.

On this _____ day of _____, 19____, before me appeared _____ and _____, to me personally known, who, being by me duly sworn, did say that they are the _____ and _____ respectively, of OAHU SUGAR COMPANY, LIMITED, a Hawaii corporation, 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 said officers acknowledged said instrument to be the free act and deed of said corporation.

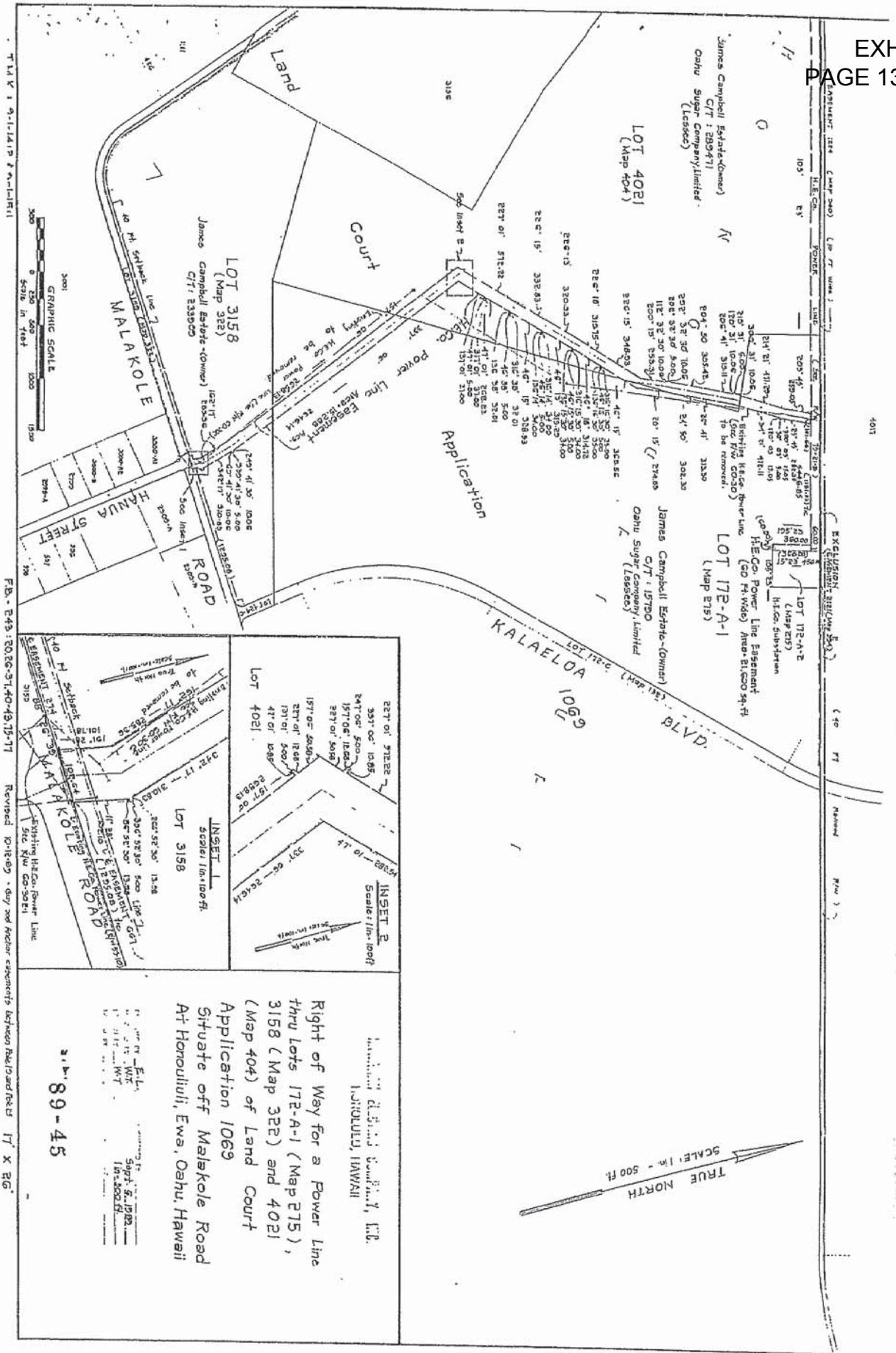
Notary Public, State of Hawaii
My commission expires: _____

State of Hawaii)
)ss
City & County of Honolulu)

On this 17th day of April, 1990, before
me appeared Mark J. O'Donnell and Jocelyn Brown to
me personally known, who, being by me duly sworn, did say that
they are ASSISTANT VICE PRESIDENT and ASSISTANT VICE PRESIDENT of
Hawaiian Trust Company and that the seal affixed to said
instrument is the corporate seal of said corporation, and that
the instrument was signed and sealed in behalf of said
corporation by authority of its board of directors, and said
Mark J. O'Donnell and Jocelyn Brown acknowledged
the instrument to be the free act and deed of said corporation.

Lucan L Kang
Notary Public, State of Hawaii

My commission expires: 5/13/92



FB-243 10026-31-40-43-15-77 Revised Porting - day and fraction elements between standard feet 1" X 8"

INSET 2
Scale: 1/8" = 100' ft

INSET 1
Scale: 1/8" = 100' ft

Right of Way for a Power Line
thru Lots 172-A-1 (Map 275),
3158 (Map 322) and 4021
(Map 404) of Land Court
Application 1069
Situate off Malakole Road
At Honolulu, Ewa, Oahu, Hawaii

89-45

ADDITIONAL SECURITY MORTGAGE AND
FINANCING STATEMENT

KNOW ALL MEN BY THESE PRESENTS: That in order to comply with the provisions of Section 506-3 of the Hawaii Revised Statutes, and the Uniform Commercial Code, and intending to create a mortgage lien under real property law and a security interest under the Uniform Commercial Code, 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 June 20, 1963, on file as Document No. 310230, and recorded in said Bureau of Conveyances in Liber 4536, at page 202, HAWAIIAN ELECTRIC COMPANY, INC., whose name was formerly The Hawaiian Electric Company, Limited, and whose principal place of business and post office address is 900 Richards Street, Honolulu, City and County of Honolulu, State of Hawaii, 96813, mortgagor in said trust mortgage, a transmitting utility 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 111 South King Street, Honolulu aforesaid, 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, and in and to the property affected thereby, together with all goods which are or are to become fixtures thereon and all improvements now or hereafter placed thereon, and all additions, purchases, and substitutions thereto and therefor, and the reversions, rents, issues, profits and proceeds thereof;

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 Hawaiian Electric Company, Inc. 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 5th day of April, 1970.

HAWAIIAN ELECTRIC COMPANY, INC.

By: Peter C. Lewis
Its VICE PRESIDENT
By: Molly M. Egged
Its SECRETARY

STATE OF HAWAII
CITY AND COUNTY OF HONOLULU } SS

On this 5th day of April, 1970, before me appeared PETER C. LEWIS
and MOLLY M. EGGED, to me personally known, who being by me duly sworn, did say that they are the VICE PRESIDENT and SECRETARY, respectively, of HAWAIIAN ELECTRIC COMPANY, INC., 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 PETER C. LEWIS
and MOLLY M. EGGED acknowledged said instrument to be the free act and deed of said corporation.

James H. Lewis
Notary Public, First Circuit
State of Hawaii
My Commission expires: 10/10/70



June 7, 2017

Ms. Wendy Oda
Director of Land & Rights of Way
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, HI 96840

Dear Ms. Oda:

AES-CEIP #1 (138kV)
Grant of Easement recorded on 7/3/1991 (LC DOC 1833214 and 1833215)
(R/W 1989-045)

This letter is written in reference to that certain Grant of Easement (Easement No. E00787600, by and among Hawaiian Electric Company, Inc., a Hawaii corporation ("HECO") as Grantee and the Trustees under the Will and of the Estate of James Campbell, Deceased, as Grantor. Any terms or phrases used in this letter shall have the same meaning as set forth in the Easement.

In accordance with Paragraph 12 "Relocation", of the referenced Grant of Easement, Grantor hereby requests Grantee to relocate the portion of the existing AES-CEIP #1 138 kV line shown in blue on the attached aerial photo to the permanent AES-CEIP #1 138kV alignment, which is located on the west side of the Harborside Drainage Channel, as shown in yellow on the attached aerial photo.

Should you have any questions, please call me at (808) 674-3229.

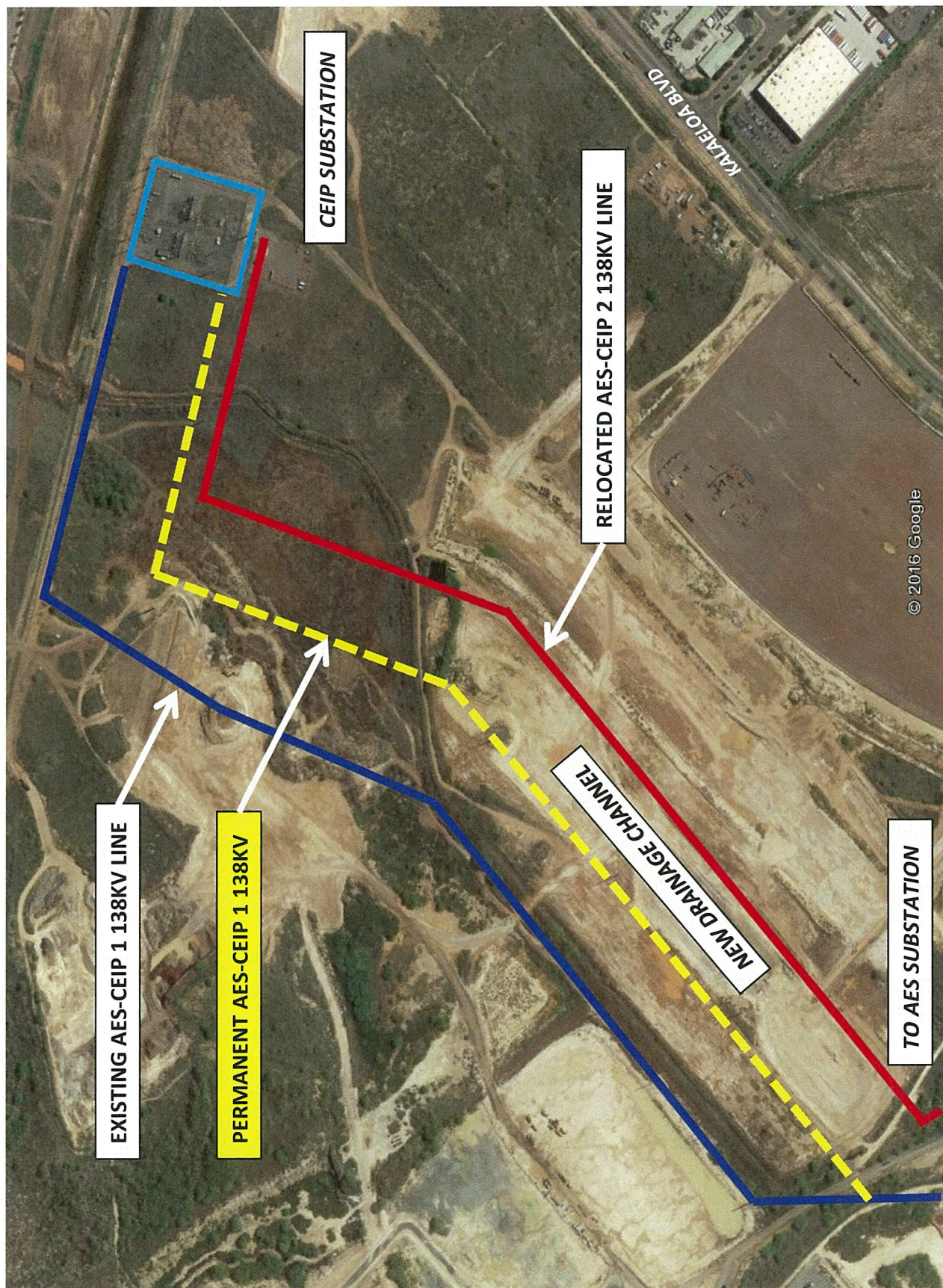
Sincerely,

John Higham
Vice President, Construction & Engineering

jlr:15036600\K11784

cc: Mark Murakami

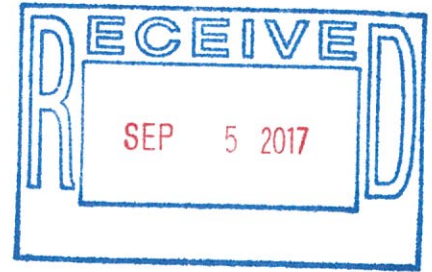
Attachment (Exhibit)





BE/G

August 25, 2017



Mr. John Higham
Kapolei Properties LLC
James Campbell Building, Suite 250
1001 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Mr. Higham:

Subject: Relocation of HECO's AES-CEIP #1 138kV Overhead Transmission Line
HECO Proposal Letter

This proposal letter is in response to Kapolei Properties LLC ("KPD" or "Developer") letter dated June 7, 2017, and in reference to Grant of Easement No. E00787600 dated July 3, 1991 by and among Hawaiian Electric Company, Inc. ("HECO") as Grantee and the Trustees under the Will and of the Estate of James Campbell, Deceased, as Grantor.

In accordance with the Grant of Easement, HECO proposes to relocate a section of its AES-CEIP #1 138kV overhead transmission line from its current interim easement to its new permanent easement. The overhead relocation work will include the installation of approximately twelve (12) new transmission steel poles and approximately 5,100 circuit feet of OPGW, 138kV, and 46kV overhead conductors. Once the relocated lines are in place, HECO will remove two (2) existing transmission steel poles, seventeen (17) existing transmission wood poles, associated equipment, and approximately 6,000 circuit feet of shield wire, 138kV, and 46kV overhead conductors. The work to install the new poles and lines and the removal of the existing poles and lines is hereinafter referred to as the "Project."

I. SCOPE OF WORK AND RESPONSIBILITIES

A. DEVELOPER's Scope of Work and Responsibilities

1. Provide easement(s), in HECO's favor, for the placement of new facilities proposed to be within private property. The easement(s) shall be perpetual, with no right of relocation at HECO's expense, and in a form satisfactory to HECO. HECO is able to assist the Developer in preparing the easement document. Prior to the installation of HECO's electrical facilities, HECO will require either (1) agreement on the form of the grant of easement and execution of a Construction Right of Entry agreement by the landowner(s); or (2) execution of the formal grant of easement document. Please note that HECO's execution of the Construction Right of Entry is contingent on the Developer providing HECO with certain approvals/assurances from the landowner(s) affected.

2. To expedite the proposed work, HECO may request the Developer and/or its consultant(s)/contractor(s) to provide whatever support for the Project that is reasonably available to them, which may include, but not be limited to, provisioning for any necessary surveys and identification of property lines; removing or trimming of vegetation; grading the areas to finish grade prior to accommodate HECO's facilities; providing a staging area for construction; and providing necessary vehicular access to the area as needed for the installation and maintenance of the Project.
3. Cooperate with HECO regarding scheduling of HECO's field inspections of all electrical facilities and infrastructure relevant to the Project.

B. HECO's Scope of Work and Responsibilities

Plan, design, procure materials and equipment, construct and install all HECO-owned electrical facilities for the Project.

II. CHANGES TO THE SCOPE OF WORK

The Developer acknowledges and agrees that any changes in the scope of work by the Developer may subject the Developer to additional costs, and necessitate the execution of a new proposal letter reflecting such upward cost adjustment.

III. DEPRECIATION AND SALVAGE VALUE

Credits for depreciation and salvage value of all existing electrical facilities that are to be replaced within the scope of the Project shall not be considered nor included in any determination of the cost or value of either party's scope of work.

IV. PROJECT CANCELLATION

The Developer shall provide prompt notice within (5) five days to HECO of cancellation of this Project. **If for any reason the project is cancelled, then the Developer shall be responsible for reimbursing HECO for all costs and expenses incurred by HECO (including, but not limited to planning, engineering, and other labor costs; costs to purchase necessary equipment and materials; any cancellation or interest charges incurred thereto; reasonable demobilization and administrative costs necessary to close out the Project) up to the time that HECO receives written notice that the Project is cancelled, as well as costs reasonably incurred thereafter to close out the Project.** The Project shall be deemed cancelled if delayed for six (6) or more months due to action or inaction by the Developer, or its consultants, contractors, employees or agents.

V. PROJECT DELAY(S)

If for any reason not caused by HECO, the Project is delayed, the Developer shall provide prompt notice to HECO of such delay and the Developer shall be responsible for other costs or expenses incurred by HECO in the performance of its obligations related to this Project,

including such reasonable carrying or inventory costs used to hold, reserve, maintain, and store materials purchased for the Project, the cost of funds for expenses incurred (i.e., Allowance for Funds Used During Construction), and costs to re-engineer or re-mobilize construction crews due to the delay.

VI. SCHEDULE

This Project will require an estimated lead-time of approximately twenty-four (24) months to complete the design and construction of the requested relocation work as indicated below and will be subject to prioritization and scheduling involving other Hawaiian Electric work requests.¹ The following is a breakdown of the estimated time to complete the various stages of the Project:

HECO Design (follows proposal accepted by Developer)	6 months
PUC Approval (concurrent with HECO design)	12 months
Ordering of Materials	6 months
Construction of HECO Facilities (follows acquisition of materials and completion of design)	6 months
Total Estimated HECO Time Required	24 months

VII. DEVELOPER'S CONTRIBUTION

HECO's relocation work is required in accordance with the Grant of Easement, as stated above. Therefore, HECO shall be responsible for the cost to relocate its facilities.

The Developer understands and agrees that, if HECO does not receive a response to this proposal letter by September 30, 2017, or, if HECO is unable to proceed with the proposed construction by April 1, 2019, this proposal letter shall automatically expire; however, the Developer's obligation to reimburse HECO for planning, engineering, labor, materials, and other costs incurred as referenced above, is absolute and unqualified, and shall survive any expiration of this proposal letter. HECO shall give the Developer ten (10) days written notice prior to termination of this letter.

Please signify your acceptance and agreement of this proposal by having a duly authorized representative or representatives, delegated with proper signature/approval authority, sign in the space provided below. To expedite the processing, we have enclosed an additional hard copy of this letter and request that the signed original be mailed to HECO in the enclosed self-addressed

¹ Please note that Hawaiian Electric's on-going prioritization process may result in project deferral. Additionally, the proposed schedule may be subject to change due to system emergencies, weather conditions, etc.

envelope. This proposal letter, upon acceptance by the Developer, constitutes the entire understanding between the parties regarding the project. The Developer shall indemnify, defend and hold harmless HECO from and against all losses, damages, claims, and actions, including but not limited to reasonable attorney's fees and costs based upon or arising out of damage to property or injuries to persons, or other tortious acts caused or contributed to by the Developer or anyone acting under its direction or control or on its behalf; provided the Developer's indemnity shall not be applicable to any liability arising from to the sole negligence of HECO.

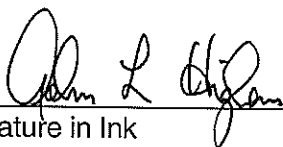
Lisa Ikeda is the Engineer assigned to this Project. If you have any questions, please contact her at 543-7977.

Sincerely,



Cecily Barnes
Vice President
Energy Delivery

Enclosures

Approved: 
Signature in Ink

Name of Signer: John L Higham
Type or Print

Title: Vice President, Construction & Engineering Date: September 18, 2017

Name of Company: Aina Nui Corporation Phone: (808) 674-3229

HRS § 269-27.6
Overhead or Underground Considerations

In planning the replacement of the section of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line between the AES and CEIP Substations, Hawaiian Electric looked at the guidelines set forth in HRS § 269-27.6 to determine whether the relocated sections should be placed, constructed, erected, or built above or below the surface of the ground. In making its determination to build the relocated section of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line overhead, Hawaiian Electric considered the following:

(1) Whether a benefit exists that outweighs the costs of placing the electric transmission system underground;

Installing the relocated section of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line underground is estimated to cost approximately \$11.9 million more than the overhead alternative (i.e., \$16.1 million versus \$4.2 million, excluding removal costs). (See Attachment 1 to this Exhibit for the underground and overhead lines capital cost estimates.) The proposed relocated transmission poles will be in an industrial area and not within high-density population areas. The existing and relocated line passes through property that is zoned I-2 (Industrial – Intensive) and IMX-1 (Industrial – Commercial Mixed Use). The visual impact will not be significantly increased, and the benefits of undergrounding, if any, do not outweigh the costs.

See Attachment 2 to this Exhibit for a visual simulation of the existing and proposed relocation of the AES-CEIP 1 138 kV overhead transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line.

This project involves the installation of twelve steel poles, P.10, P.11, P12, P13, P14, P15, P16, P17, P18, P19, P20, and P21, and the installation of eleven spans of overhead conductor for the relocated AES-CEIP 1 138 kV overhead transmission line and the underbuilt Kahe-Standard Oil 1 46 kV overhead sub-transmission line. The rest of the existing 138 kV and 46 kV lines outside of the Project area (i.e., approximately 1.2 miles) will remain overhead.

(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;

Hawaiian Electric is not aware of any governmental public policy requiring the relocated sections of the 138 kV and 46 kV lines to be constructed underground in the area.

(3) Whether any governmental agency or other parties are willing to pay for the additional costs of undergrounding;

The new steel poles P.10, P.11, P12, P13, P14, P15, P16, P17, P18, P19, P.20, and P21 of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line will be located along a future drainage channel within Lot bearing Tax Map Key: 9-1-014:033 owned by KPD. Hawaiian Electric asked KPD if they would be willing to pay for the additional costs of undergrounding the 138 kV and 46 kV lines. KPD responded that they are not willing to pay for the additional undergrounding costs (see Attachment 3 to this Exhibit).

(4) The amortized cost of construction over the respective usable life of an above-ground versus underground system;

The estimated cost difference between the overhead and underground installations of the relocated section of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line are due to the cost of poles and conductors and their installation for an above ground line versus the cost of duct lines and conductors and their installation for an underground line.

The estimated initial capital cost of the overhead and underground transmission line options are summarized as follows:

	<u>Overhead</u>	<u>Underground</u>
Initial Capital Cost	\$4.2 million	\$16.1 million

The overhead and underground initial capital costs are shown in Attachment 1 to this Exhibit.

The combined capital and O&M estimated rate impacts (cents/kWh) for Hawaiian Electric customers for the overhead and underground installations are as follows:

	<u>2020</u>	<u>2021</u>	<u>2022</u>
Overhead	0.0078	0.0076	0.0074
Underground	0.0280	0.0273	0.0267

For a Hawaiian Electric customer that uses 500 kWh of electricity per month, the estimated bill impacts (\$/month) for overhead and underground installations are as follows:

	<u>2020</u>	<u>2021</u>	<u>2022</u>
Overhead	\$0.04	\$0.04	\$0.04
Underground	\$0.14	\$0.14	\$0.13

The combined capital and O&M amortized cost calculations for the overhead and underground alignments are shown in Attachment 4 to this Exhibit.

(5) The amortized cost of repair over the respective usable life of an above-ground versus underground system;

Historical operating and maintenance (“O&M”) costs for both overhead and underground transmission lines are shown in the table below:

Year	<u>Annual Operating and Maintenance Costs (per mile)</u>	
	<u>Overhead Cost</u>	<u>Underground Cost</u>
2012	\$14,865	\$3,178
2013	\$18,041	\$20,476
2014	\$17,607	\$17,707
2015	\$18,743	\$8,998
2016	\$14,701	\$8,595
Average	\$16,791	\$11,791

These historical maintenance costs over the last five years show that the average operation and maintenance costs of overhead and underground transmission lines are about the same.

See the response to item (4) above for the combined capital and O&M rate and bill impacts.

The combined capital and O&M amortized cost calculations for the overhead and underground alignments are shown in Attachment 4 to this Exhibit.

(6) The risk of damage or destruction over the respective usable life of an above-ground versus an underground system;

There are tradeoffs in the reliability of underground and overhead systems. Overhead lines are subject to more frequent outages, but they tend to be of shorter duration than outages for underground lines. When faults occur in underground systems, repairs can take weeks instead of days. When lines are underground, they are not exposed to faults from insulator and shield wire failure. However, underground lines experience their own host of problems from construction, heat and ground movement.

When developing wind pressure designs for the proposed transmission line, Hawaiian Electric follows Hawaii Administrative Rules (“HAR”) Chapter 6-73 (Installation, Operation, and Maintenance of Overhead and Underground Electrical Supply and Communication Lines), including the National Electric Safety Code, 2002 Edition (“NESC”). The formulas used to develop the wind pressures take wind effects (such as gusts, conductor drag, and terrain) into consideration. The poles and conductors would be designed to survive the anticipated wind loads of an Iniki-class hurricane. It is unlikely that the proposed poles or lines would be knocked down or cause hazards during storms (e.g., high winds, rains, hurricanes).

As for the lateral loads due to earthquakes, the City and County Building Code requires that structures be designed in accordance with the seismic design provisions of the 2006 International Building Code. The magnitude of the design loading is a function of the structure’s mass, and is a site specific calculation that varies according to the characteristics of the soils onsite. Because an overhead transmission line is a flexible system generally constructed out of materials that do not have large concentrations of mass, the lateral loads

are governed by the wind pressure on the exposed surface area. Accordingly, Hawaiian Electric does not anticipate a significant risk of damage to, or destruction of, the above ground transmission line due to seismic activity.

(7) The relative safety and liability risks of an above-ground versus underground system;

No long-term health-related impacts are expected in association with either the proposed underground or overhead options for this project. Specifically, Hawaiian Electric's transmission lines are built and operated in accordance with numerous health and safety guidelines, including design and operation standards contained within the NESC, and worker health and safety standards determined by the Federal Occupational Safety and Health Administration ("OSHA").

(8) The electromagnetic field emission exposure from an above-ground versus underground system;

The "Hawaiian Electric Company, AES-CEIP 1 138 kV Transmission Line Relocation, Electric and Magnetic Field Evaluation" ("EMF") study was prepared by Sargent and Lundy LLC. The EMF study evaluated the electric and magnetic fields from the proposed above-ground system and the alternate underground system. A copy of the EMF study and electric and magnetic field comparisons is attached as Attachment 5 to this Exhibit.

(9) The proximity and visibility of an above-ground system to:

(A) High density population areas;

The relocated portion of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line is away from high-density population areas. The closest townhomes are located in Ko Olina Fairways (approximately 0.6 mile away) and the closest homes are located in Honokai Hale (approximately 0.8 mile away) and in Makakilo (approximately 1.1 miles away). (See Exhibit III for digital photographs of the Project area.) The existing and relocated portion of the line will pass through property that is zoned I-2 (Industrial – Intensive) and IMX-1 (Industrial – Commercial Mixed Use).

(B) Conservation and other valuable natural resource and public recreation areas;

The relocated portion of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line is not located in conservation areas, or areas with other valuable natural resources.

The nearest area used for public recreation is Ko Olina golf course. This golf course is located next to Ko Olina Fairways (approximately 0.6 mile from the nearest point, P30, on the Project site). The views from Ko Olina Fairways and the golf course are blocked by vegetation. See Exhibit III, Page 3 of 5.

(C) Areas of special importance to the tourism industry;

The nearest area that may be important to the visitor industry is Kapolei Commons (approximately 0.2 mile from the nearest point, P34, on the Project site). The visual impact should be minimal as there are existing 138 kV overhead transmission line in the Project area. See Exhibit III, Page 5 of 5.

(D) Other industries particularly dependent on Hawaii's natural beauty;

The relocated section of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line that Hawaiian Electric proposes to construct and operate would not adversely affect industries that are dependent upon Hawaii's natural environment.

(10) The length of the system;

The length of both the proposed overhead relocation and the alternative underground relocation are approximately 5,400 circuit feet in length. This represents 47% of the overall length of the AES-CEIP 1 138 kV line, i.e., approximately 5,400 circuit feet out of 2.2 miles.

(11) The breadth and depth of public sentiment with respect to an above-ground versus underground system;

A public hearing pursuant to HRS § 269-27.5 is not being requested because the relocated line will pass through property that is zoned I-2 (Industrial – Intensive) and IMX-1 (Industrial – Commercial Mixed Use) which is not zoned for residential use. (See Application, Section IV.)

Hawaiian Electric will inform the Makakilo/Kapolei/Honokai Hale Neighborhood Board (the Neighborhood Board closest to the Project site) regarding the proposed transmission project. Hawaiian Electric will not request formal action by the Neighborhood Board.

Subsequent to the filing of the subject Application, Hawaiian Electric will take steps to publicize the subject Project, and to seek public comments. These steps may include publishing a public notice of the filing of the Application and/or including notification about the subject Project on the Company's website.¹

Hawaiian Electric does not expect that there is a substantial desire on the part of the community for undergrounding the relocated sections of the AES-CEIP 1 138 kV transmission line and the underbuilt Kahe-Standard Oil 1 46 kV sub-transmission line. The public notices of the subject Application should help in determining the breadth and depth of public sentiment with respect to an above-ground versus underground relocation for the subject Project.

¹ Similar actions were taken by the Company for the 138kV project that was the subject of Docket No. 2016-0439 (AES-CEIP 2 138kV Overhead Transmission Line Relocation Project).

COST ESTIMATE OVERHEAD

PROJECT TITLE: AES-CEIP 1 138KV OVERHEAD RELOCATION
BUDGET ITEM: P0004085

TOTALS

LABOR	\$592,871
MATERIALS	\$1,526,615
STORES ON-COST	\$246,243
OUTSIDE SERVICES	\$619,475
ON-COSTS	\$1,185,645
OTHER	\$0
LAND	\$0
ALLOWANCE FOR FUNDS USED DURING CONSTRUCTION	\$56,736
<u>TOTAL CAPITAL COST OF PROJECT</u>	<u>\$4,227,585</u>
Estimated Contributions	(\$0)
<u>NET PROJECT COST</u> (Less Cash and In-Kind Contributions)	<u>\$4,227,485</u>

COST ESTIMATE OVERHEAD

Labor hours and projected loaded rates are as follows:

	<u>GROUP</u>	<u>HOURS</u>	<u>DOLLARS</u>
ENGINEERING			
Transmission & Distribution	(BE)	626	\$30,565
Structural & Survey	(BT)	432	\$20,895
Substation & Telecom	(BY)	48	\$2,219
Reg Rate Proceedings	(NP)	16	\$694
CONSTRUCTION & MAINTENANCE			
Planning	(DP)	414	\$20,365
Operations	(DS)	14,204	\$501,961
Field Operation	(DF)	72	\$4,406
TEST & SUBSTATION			
Communications Division	(RC)	216	\$11,766
TOTAL		16,028	\$592,871

The breakdown of materials and outside services and their estimated costs for each item costing \$1,000 or more are shown below.

MATERIAL COSTS:

<u>QTY</u>	<u>ITEM</u>	<u>TOTAL COST</u>
12	Pole, Steel, 120 FT	\$1,375,720
12	Steel Pole Framing	\$22,050
5,400'	Shield Wire, AAAC, #3/0	\$2,585
16,200'	Conductor, ACSS/AW/TW, 1780 KCM	\$91,105
14,400'	Conductor, AAC, 556.4KCM	\$16,195
1,800'	Ground Wire, Bare, Cu, #2	\$12,330
1 Lot	Miscellaneous Material (< \$1,000)	\$6,630

OUTSIDE CONSULTANT SERVICES COSTS:

<u>QTY</u>	<u>ITEM</u>	<u>TOTAL COST</u>
1 Lot	Sargent & Lundy	\$173,000

OUTSIDE CONSTRUCTION SERVICES COSTS:

<u>QTY</u>	<u>ITEM</u>	<u>TOTAL COST</u>
12	Foundation, 120 FT, Steel Pole	\$446,475

COST ESTIMATE UNDERGROUND

PROJECT TITLE: AES-CEIP 1 138KV UNDERGROUND RELOCATION
BUDGET ITEM: P0004085

TOTALS

LABOR	\$156,397
MATERIALS	\$228,532
STORES ON-COST	\$36,862
OUTSIDE SERVICES	\$12,988,270
ON-COSTS	\$2,681,548
OTHER	\$0
LAND	\$0
ALLOWANCE FOR FUNDS USED DURING CONSTRUCTION	\$64,130
<u>TOTAL CAPITAL COST OF PROJECT</u>	<u>\$16,155,739</u>
Estimated Contributions	(\$0)
<u>NET PROJECT COST</u> (Less Cash and In-Kind Contributions)	<u>\$16,155,739</u>

COST ESTIMATE UNDERGROUND

Labor hours and projected loaded rates are as follows:

	<u>GROUP</u>	<u>HOURS</u>	<u>DOLLARS</u>
ENGINEERING			
Transmission & Distribution	(BE)	1,088	\$53,060
Structural & Survey	(BT)	616	\$31,966
Substation & Telecom	(BY)	96	\$4,497
Reg Rate Proceedings	(NP)	24	\$1,041
CONSTRUCTION & MAINTENANCE			
Planning	(DP)	144	\$7,131
Operations	(DS)	690	\$37,815
Field Operation	(DF)	144	\$8,897
TEST & SUBSTATION			
Communications Division	(RC)	216	\$11,990
TOTAL		3,018	\$156,397

The breakdown of materials and outside services and their estimated costs for each item costing \$1,000 or more are shown below.

MATERIAL COSTS:

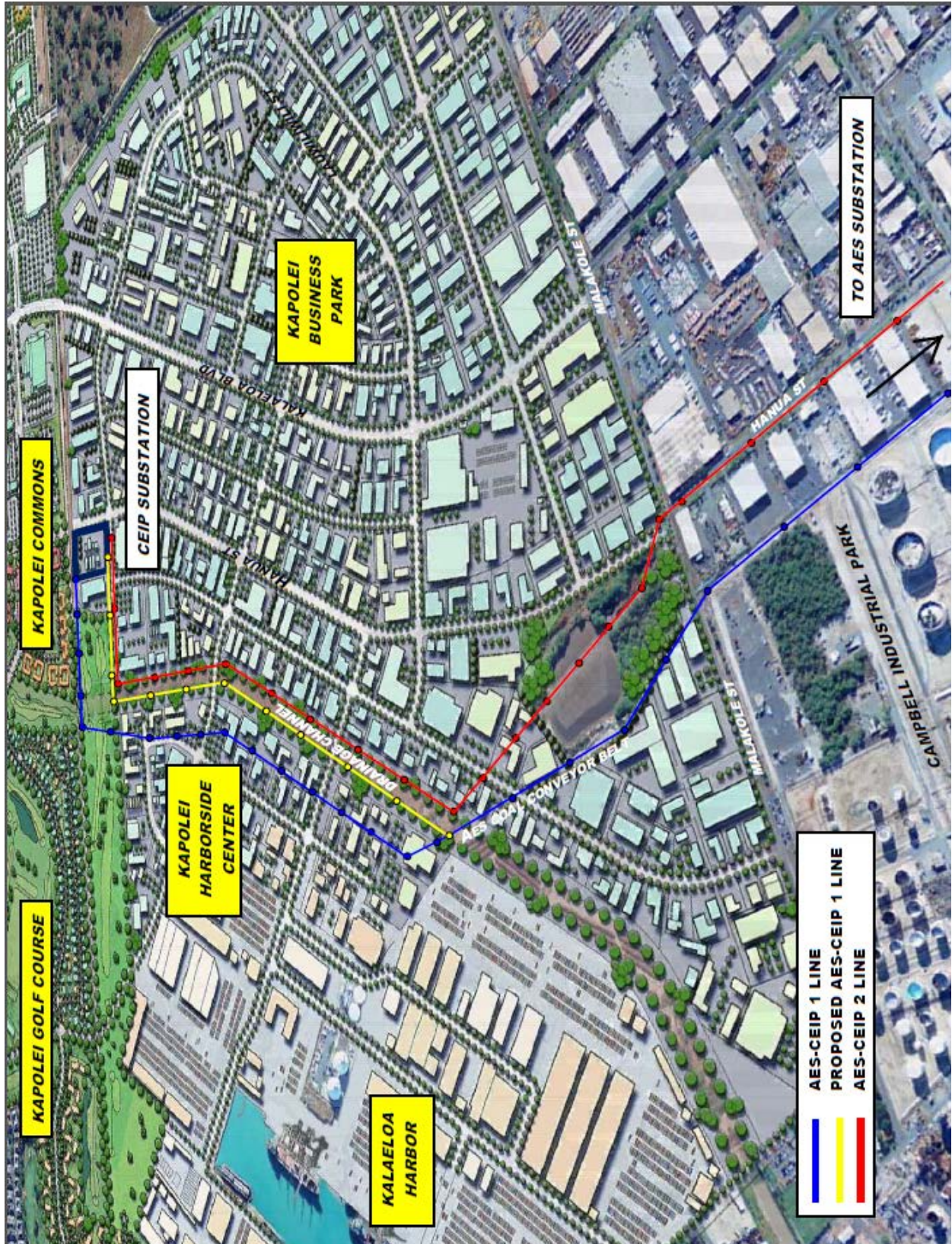
<u>QTY</u>	<u>ITEM</u>	<u>TOTAL COST</u>
2	Pole, Steel, 120 FT	\$220,000
2	Riser, Underground, Steel Pole Framing	\$4,450
300'	Ground Wire, Bare, Cu, #2	\$2,055
1 Lot	Miscellaneous Material (< \$1,000)	\$2,027

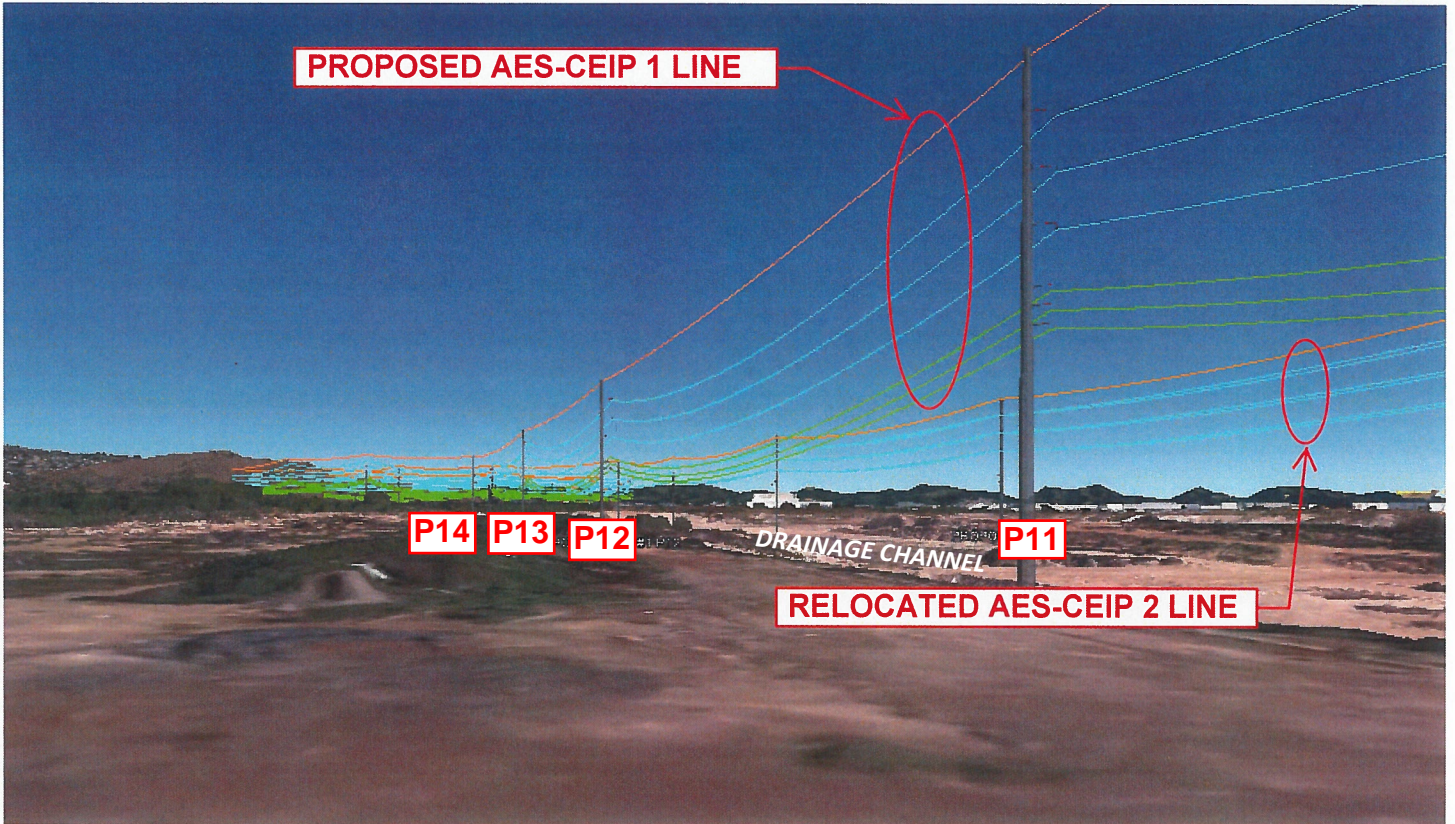
OUTSIDE CONSULTANT SERVICES COSTS:

<u>QTY</u>	<u>ITEM</u>	<u>TOTAL COST</u>
1 Lot	Sargent & Lundy	\$638,800
1 Lot	Soils Investigation	\$75,210
1 Lot	Construction Management	\$64,440

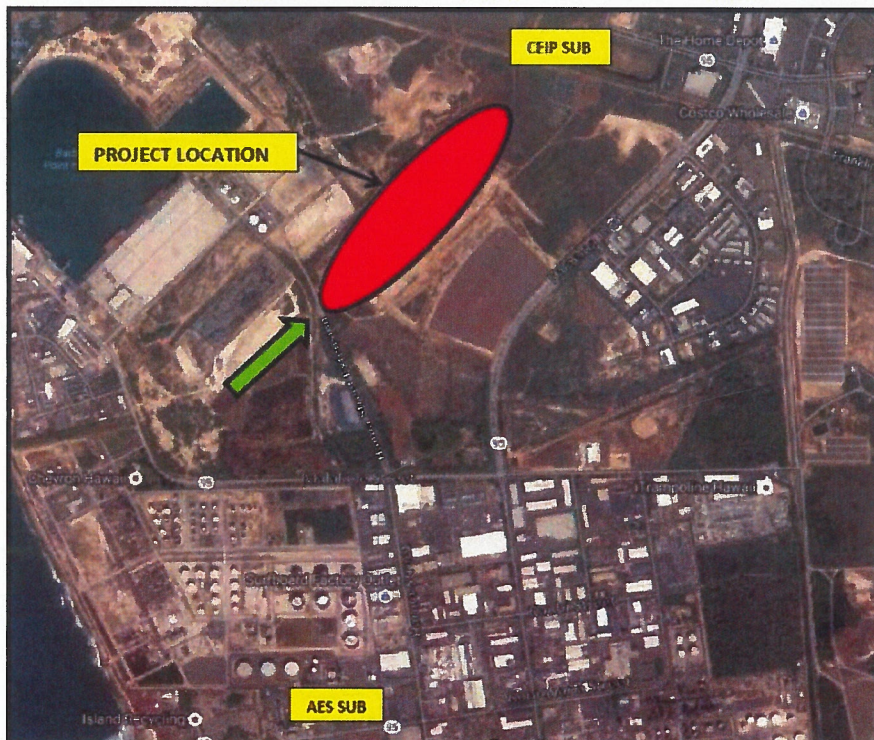
OUTSIDE CONSTRUCTION SERVICES COSTS:

<u>QTY</u>	<u>ITEM</u>	<u>TOTAL COST</u>
2	Foundation, 120 FT, Steel Pole	\$80,720
1 Lot	Duct Line Construction	\$7,782,180
1 Lot	Furnish and Install Cable/Splices/Terminations	\$4,346,920





Simulation of Proposed View from Hanua Street Extension.
(AES-CEIP 1 & 2 138kV Lines Relocated To Border Drainage Channel)



From: [Higham, John](#)
To: [Ikeda, Lisa Y. M.](#)
Cc: [Field, Robby](#); [Kelly, Steve](#); [Myers, Brad](#); [Okano, Jenny](#)
Subject: AES-CEIP 1 138kV Overhead Transmission Line Relocation
Date: Friday, February 16, 2018 4:20:04 PM

Lisa,

Kapolei Properties in not willing to pay for the additional cost to underground the relocated portion of the AES-CEIP 1 138 KV overhead transmission line.



John L Higham | Vice President, Construction & Engineering
Kapolei Properties Division

Aina Nui Corporation | Kapolei Properties LLC | Fort Street Investment Corporation
Affiliates of the James Campbell Company LLC
James Campbell Building, Suite 250; 1001 Kamokila Boulevard; Kapolei, HI 96707

[www.kapolei.com](#) | [www.jamescampbell.com](#)

From: Ikeda, Lisa Y. M. [REDACTED]
Sent: Friday, February 16, 2018 6:51 AM
To: Higham, John
Cc: Field, Robby; Kelly, Steve
Subject: AES-CEIP 1 138kV Overhead Transmission Line Relocation

Hi John,

We are seeking approval from the PUC for Kapolei Properties' request to relocate a portion of the AES-CEIP 1 138kV overhead transmission line. We are required to comply with HRS §269-27.6 by identifying whether any government agency or other parties are willing to pay for the additional costs of undergrounding.

We have estimated the differential cost for an underground alignment to the proposed overhead alignment be approximately \$11,928,072.

Please let me know if Kapolei Properties is willing to pay for the additional cost to underground the relocated portion of the AES-CEIP 1 138kV overhead transmission line.

Should you have any questions, please feel free to contact me.

Regards,
Lisa Ikeda
Engineering Department
Hawaiian Electric Company, Inc.

Note: Personal email addresses and/or telephone and facsimile numbers are considered confidential due to privacy concerns and have been redacted from this Attachment.

Estimated Typical Residential Bill Impact					
Line	Description	2020	2021	2022	
a	Overhead Revenue Requirement (Current Year \$)	510,679	497,847	485,611	
b	Estimated HE Sales (MWh) ¹	6,557,000	6,566,500	6,530,600	
c = (a/b)/10	Estimated Bill Impact (cents/kwh in Current Year \$)	0.0078	0.0076	0.0074	
d = (500*c)/100	Estimated Typical Residential Bill Impact of 500 kwh (Current Year \$)	\$ 0.04	\$ 0.04	\$ 0.04	
e	Underground Revenue Requirement (Current Year \$)	1,835,583	1,789,444	1,745,563	
f	Estimated HE Sales (MWh) ¹	6,557,000	6,566,500	6,530,600	
g = (e/f)/10	Estimated Bill Impact (cents/kwh in Current Year \$)	0.0280	0.0273	0.0267	
h = (500*g)/100	Estimated Typical Residential Bill Impact of 500 kwh (Current Year \$)	\$ 0.14	\$ 0.14	\$ 0.13	

Notes:

1. Sales Forecast from the 2017 Long term forecast (HE Jun 17 fct for Fin Analysis.xlsx file) obtained from Forecasting Division.

Year	Overhead	Underground	Difference
	Revenue Requirement	Revenue Requirement	
	A	B	C=A-B
1	229,866	819,819	(589,953)
2	510,679	1,835,583	(1,324,904)
3	497,847	1,789,444	(1,291,597)
4	485,611	1,745,563	(1,259,951)
5	473,929	1,703,771	(1,229,842)
6	462,760	1,663,915	(1,201,155)
7	452,065	1,625,847	(1,173,782)
8	441,811	1,589,436	(1,147,625)
9	431,806	1,553,951	(1,122,145)
10	421,844	1,518,605	(1,096,760)
11	411,891	1,483,264	(1,071,373)
12	419,854	1,516,361	(1,096,507)
13	408,614	1,476,046	(1,067,432)
14	397,383	1,435,738	(1,038,354)
15	386,162	1,395,436	(1,009,273)
16	374,951	1,355,141	(980,190)
17	363,750	1,314,853	(951,103)
18	352,559	1,274,572	(922,013)
19	341,378	1,234,298	(892,920)
20	330,207	1,194,032	(863,825)
21	320,310	1,158,597	(838,287)
22	312,948	1,132,816	(819,869)
23	306,859	1,111,867	(805,008)
24	300,781	1,090,926	(790,145)
25	294,716	1,069,993	(775,278)
26	288,662	1,049,069	(760,407)
27	282,620	1,028,153	(745,533)
28	276,591	1,007,245	(730,655)
29	270,574	986,347	(715,773)
30	264,570	965,457	(700,888)
31	258,579	944,577	(685,998)
32	252,601	923,706	(671,105)
33	246,637	902,845	(656,208)
34	240,687	881,993	(641,306)
35	234,751	861,151	(626,400)
36	228,829	840,320	(611,490)
37	222,923	819,499	(596,576)
38	217,031	798,688	(581,657)
39	211,155	777,888	(566,734)
40	205,294	757,099	(551,805)
41	199,449	736,322	(536,872)
42	193,621	715,555	(521,935)
43	187,809	694,801	(506,992)
44	182,014	674,058	(492,044)
45	176,236	653,328	(477,091)
46	170,476	632,609	(462,133)
47	164,734	611,904	(447,170)
48	159,010	591,211	(432,201)
49	153,305	570,531	(417,226)
50	147,619	549,865	(402,246)
51	630,067	622,482	7,585
52	1,413,286	750,231	663,055
53	1,377,139	723,946	653,193
54	1,342,631	697,984	644,647
55	1,309,642	672,324	637,318
56	1,278,060	646,944	631,116
57	1,247,781	621,823	625,958
58	1,218,710	596,945	621,765
59	1,190,323	572,209	618,114
60	1,162,055	547,508	614,546
Total	27,336,050	61,516,492	(34,180,443)
NPV at 3.0%	11,191,946	33,211,014	(22,019,067)
NPV at 7.0%	5,544,759	19,131,377	(13,586,618)
NPV at 12.0%	3,411,974	12,212,232	(8,800,259)

**AES-CEIP 1 138KV OH vs UG
Revenue Requirements Model
Assumptions**

Manual Input	Weight	Rate	Weighted Average	After-Tax Weighted Average	Weighted Average	Weighted Average
HECO 7/2017 Rate Case Dkt 2016-0228 /m/rrm D&O 35/100						
Cost of Capital Assumptions:						
Short Term Debt (Taxable Debt)	18%	7.75%	0.02%	0.02%	0.02%	0.02%
Long Term Debt (Taxable Debt)	39.69%	5.03%	1.95%	1.95%	1.95%	1.95%
Hydro	1.22%	7.19%	0.09%	0.07%	0.09%	0.09%
Preferred Stock	0.90%	5.37%	0.05%	0.05%	0.072%	0.07%
Common Stock	57.10%	9.50%	5.42%	5.42%	8.018%	7.31%
	100.00%		7.57%	7.032%	10.395%	9.471%

Tax Assumptions	Effective
Federal Income Tax Rate	21.00%
State Income Tax Rate	6.40%
State Investment Tax Credit (ITC)	4.00%
Accelerated State ITC Amortization Period ¹	10
Public Service Company Tax	5.885%
PUC Fee	0.500%
Franchise Tax	2.500%
Composite Revenue Tax Rate	8.865%
Project Assumptions	
Source: <i>USA Feeds, Engineers III - Engineering</i>	
	1.09751

	Initial Capital	Replacement Capital	UG Conduit and Devices	OH Conductors and Devices	UG Conduit and Devices	DIST. UG Conductors and Devices	UG Conduit and Devices	DIST. UG Conductors and Devices
Overhead								
Initial Capital								
UG Conduit	\$ -	\$ -	60	60	51	60	51	60
UG Conductors and Devices	\$ -	\$ -	20	20	20	20	20	20
Poles & Fixtures	\$ 3,170,614	\$ 807,787	30	30	30	30	30	30
OH Conductors and Devices	\$ 1,056,871	\$ -						
DIST. UG Conduit	\$ -	\$ -						
DIST. UG Conductors and Devices	\$ -	\$ -						
Replacement Capital	4,227,485	16,155,739						
UG Conduit	\$ -	\$ -	60	60	51	60	51	60
UG Conductors and Devices	\$ -	\$ -	20	20	20	20	20	20
Poles & Fixtures	\$ 8,704,666	\$ 2,217,714	30	30	30	30	30	30
OH Conductors and Devices	\$ 2,901,555	\$ -						
DIST. UG Conduit	\$ -	\$ -						
DIST. UG Conductors and Devices	\$ -	\$ -						
Land	\$ 51	\$ -						
CHAC	\$ -	\$ -						
O&M	\$ 16,791	\$ 11,730						
O&M Inputs	\$ 17,127	\$ 12,026						
	2.0%	2.0%						

	Initial Capital	Replacement Capital	UG Conduit and Devices	OH Conductors and Devices	UG Conduit and Devices	DIST. UG Conductors and Devices	UG Conduit and Devices	DIST. UG Conductors and Devices
Depreciation - Overhead								
Expected Useful Life ²								
MACRS Tax Life ("Tax Life") *	60	60	50	50	51	60	51	60
Tax Class Life ("Class Life") *	30	30	30	30	30	30	30	30
Depreciation - Underground								
Expected Useful Life ²								
MACRS Tax Life ("Tax Life") *	60	60	50	50	51	60	51	60
Tax Class Life ("Class Life") *	30	30	30	30	30	30	30	30

* half-year convention, table A-1
+ half-year convention, table A-8

December 2019

0%

Bonus Depreciation²

Recovery Method (Rate Case or MPPR)

Rate Case

Notes:

1. Per HECO 2017 TY Rate Case Parties' Stipulated Settlement Letter in Docket No. 2016-0328, State ITC Amortization accelerated over a ten-year period.
2. Per HEI Corporate Tax, the Tax Cuts and Jobs Act of 2017 eliminated bonus depreciation for public utility property placed in service after 9/27/17.
3. Expected Useful life per HECO PUC Approved Average Service Life (HECO-Settlement-104, Dkt No. 2010-0053)

AES-CEIP 1 138KVOH vs UG																																	
Tax Depreciation Factors																																	
Manual Input	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	27	28	29	30		
Tax Depreciation Rates (Straight Line)																																	
	3	16.670%	33.330%	33.330%	16.670%	20.000%	10.000%																										
	5	10.000%	20.000%	20.000%	14.280%	20.000%	14.280%	10.000%	7.140%																								
	7	7.140%	14.290%	10.000%	14.280%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	6.660%	6.670%	3.500%																
	15	3.330%	6.670%	6.670%	6.670%	6.670%	6.670%	6.670%	6.660%	6.670%	6.670%	6.670%	6.660%	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%		
	20	2.500%	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%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%		
	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%	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%	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%	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%	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%	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%	4.460%																										
	10	10.000%	18.000%	14.400%	11.520%	9.220%	7.370%	6.550%																									
	15	5.000%	9.500%	8.550%	7.700%	6.930%	6.230%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	5.910%	5.900%	
	20	3.750%	7.219%	6.677%	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%	4.462%	4.461%	4.462%	4.461%	4.462%	
Source: IRS Publication 946, Table A-1																																	

Revenue Requirements Model - Calculations																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Manual input																					
Accumulated deferred tax asset		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deferred Tax Calculation - Depreciation																					
Book Accumulated Depreciation		-	86,275	172,550	258,826	345,101	431,376	517,651	603,926	690,202	776,477	862,752	949,027	1,035,302	1,121,578	1,207,853	1,294,128	1,380,403	1,466,678	1,552,954	1,639,229
Tax Accumulated Depreciation		158,531	463,713	745,982	1,007,114	1,248,630	1,472,053	1,678,692	1,869,859	2,058,489	2,247,077	2,435,708	2,624,296	2,812,926	3,001,514	3,190,145	3,378,733	3,567,363	3,755,951	3,944,582	4,133,170
Book/Tax Acc Depr Difference		(158,531)	(377,438)	(573,432)	(748,288)	(903,529)	(1,040,677)	(1,161,041)	(1,265,932)	(1,368,288)	(1,470,601)	(1,572,956)	(1,675,269)	(1,777,624)	(1,879,937)	(1,982,292)	(2,084,605)	(2,186,960)	(2,289,273)	(2,391,628)	(2,493,941)
Deferred ITC		169,099	152,189	135,280	118,370	101,460	84,550	67,640	50,730	33,820	16,910	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Net Deferred Tax Asset (Liability)		2,722	(58,006)	(112,832)	(162,216)	(206,548)	(246,221)	(281,571)	(312,938)	(343,651)	(374,353)	(405,066)	(431,413)	(457,772)	(484,119)	(510,477)	(536,825)	(563,183)	(589,531)	(615,889)	(642,237)
Deferred Tax Base		(10,569)	235,817	212,904	191,766	172,151	154,057	137,274	121,802	119,265	119,223	119,265	102,313	102,355	102,313	102,355	102,313	102,355	102,313	102,355	102,313
Deferred Taxes - Federal		(2,086)	46,543	42,021	37,849	33,977	30,406	27,094	24,040	23,539	23,531	23,539	20,193	20,202	20,193	20,202	20,193	20,202	20,193	20,202	20,193
Deferred Taxes - State excluding credit		(636)	14,184	12,806	11,535	10,355	9,267	8,257	7,326	7,171	7,171	6,154	6,157	6,154	6,157	6,154	6,157	6,154	6,157	6,154	6,154
Change in Deferred Taxes		(2,722)	60,727	54,827	49,383	44,332	39,673	35,351	31,366	30,713	30,702	30,713	26,347	26,358	26,347	26,358	26,347	26,358	26,347	26,358	26,347
Accumulated Deferred Taxes		(2,722)	58,006	112,832	162,216	206,548	246,221	281,571	312,938	343,651	374,353	405,066	431,413	457,772	484,119	510,477	536,825	563,183	589,531	615,889	642,237
Change in Deferred ITC	check	169,099	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)
		169,099	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)
Rate Base and Financing																					
Investment: (Rate Base)																					
Land		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Plant		4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485
Accumulated Depreciation		-	86,275	172,550	258,826	345,101	431,376	517,651	603,926	690,202	776,477	862,752	949,027	1,035,302	1,121,578	1,207,853	1,294,128	1,380,403	1,466,678	1,552,954	1,639,229
CIAC		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated CIAC Amortization		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated Deferred Taxes		(2,722)	58,006	112,832	162,216	206,548	246,221	281,571	312,938	343,651	374,353	405,066	431,413	457,772	484,119	510,477	536,825	563,183	589,531	615,889	642,237
Accumulated Deferred ITC		169,099	152,189	135,280	118,370	101,460	84,550	67,640	50,730	33,820	16,910	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Ending Net Investment		4,061,107	3,931,015	3,806,823	3,688,074	3,574,377	3,465,339	3,360,623	3,259,891	3,159,813	3,059,746	2,959,667	2,847,045	2,734,411	2,621,788	2,509,155	2,396,532	2,283,898	2,171,276	2,058,642	1,946,019
Average Net Investment		2,030,554	3,996,061	3,868,919	3,747,448	3,631,225	3,519,858	3,412,981	3,310,257	3,209,852	3,109,779	3,009,706	2,903,356	2,790,728	2,678,100	2,565,472	2,452,843	2,340,215	2,227,587	2,114,959	2,002,331
Average Financing:																					
Short Term Debt	1.18%	24,040	47,309	45,804	44,366	42,990	41,672	40,406	39,190	38,001	36,817	35,632	34,373	33,039	31,706	30,373	29,039	27,706	26,372	25,039	23,706
Long Term Debt (Taxable Debt)	39.59%	803,990	1,582,226	1,531,884	1,483,788	1,437,770	1,393,675	1,351,357	1,310,684	1,270,929	1,231,306	1,191,682	1,149,573	1,104,978	1,060,384	1,015,789	971,194	926,600	882,005	837,410	792,816
Hybrids	1.22%	24,802	48,810	47,257	45,773	44,354	42,994	41,688	40,433	39,209	37,985	36,762	35,463	34,088	32,712	31,336	29,960	28,585	27,209	25,833	24,458
Preferred Stock	0.90%	18,298	36,009	34,864	33,769	32,722	31,718	30,755	29,829	28,925	28,023	27,121	26,163	25,148	24,133	23,118	22,103	21,088	20,073	19,058	18,043
Common Equity	57.10%	1,159,424	2,281,707	2,209,110	2,139,751	2,073,389	2,009,800	1,948,774	1,890,120	1,832,790	1,775,649	1,718,509	1,657,784	1,593,475	1,529,165	1,464,856	1,400,546	1,336,237	1,271,928	1,207,618	1,143,309
Total Financing		2,030,554	3,996,061	3,868,919	3,747,448	3,631,225	3,519,858	3,412,981	3,310,257	3,209,852	3,109,779	3,009,706	2,903,356	2,790,728	2,678,100	2,565,472	2,452,843	2,340,215	2,227,587	2,114,959	2,002,331
Return on Investment																					
Short Term Debt	1.75%	421	828	802	776	752	729	707	686	665	644	624	602	578	555	532	508	485	462	438	415
Long Term Debt (Taxable Debt)	5.03%	40,441	79,586	77,054	74,635	72,320	70,102	67,973	65,927	63,928	61,935	59,942	57,824	55,580	53,337	51,094	48,851	46,608	44,365	42,122	39,879
Hybrids	7.19%	1,783	3,509	3,398	3,291	3,189	3,091	2,997	2,907	2,819	2,731	2,643	2,550	2,451	2,352	2,253	2,154	2,055	1,956	1,857	1,759
Total Interest Expense		42,645	83,923	81,253	78,702	76,261	73,922	71,678	69,520	67,412	65,310	63,208	60,975	58,610	56,244	53,879	51,513	49,148	46,783	44,417	42,052
Preferred Dividends	5.37%	983	1,934	1,872	1,813	1,757	1,703	1,652	1,602	1,553	1,505	1,456	1,405	1,350	1,296	1,241	1,187	1,132	1,078	1,023	969
Net Income on Common	9.50%	110,145	216,762	209,865	203,276	196,972	190,931	185,134	179,561	174,115	168,687	163,258	157,489	151,380	145,271	139,161	133,052	126,943	120,833	114,724	108,614
Income Taxes																					
Income Before Pref Dividends		111,128	218,696	211,738	205,090	198,729	192,634	186,785	181,163	175,668	170,192	164,715	158,894	152,731	146,567	140,403	134,239	128,075	121,911	115,747	109,583
Income Before Taxes (including ITC)		149,671	294,547	285,176	276,222	267,655	259,447	251,569	243,997	236,596	229,220	221,844	214,005	205,703	197,401	189,099	180,798	172,496	164,194	155,892	147,591
Investment Tax Credit		-	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910	16,910
Income Before Taxes (excluding ITC)		149,671	277,637	268,266	259,312	250,746	242,537	234,659	227,087	219,686	212,310	204,934	214,005	205,703	197,401	189,099	180,798	172,496	164,194	155,892	147,591
Federal Income Tax		29,540	58,134	56,285	54,518	52,827	51,207	49,652	48,157	46,697	45,241	43,785	42,238	40,599	38,961	37,322	35,684	34,045	32,407	30,768	29,130
State Income Tax		9,003	17,717	17,153	16,615	16,100	15,606	15,132	14,677	14,231	13,788	13,344	12,872	12,373	11,874	11,374	10,875	10,376	9,876	9,377	8,878
State Investment Tax Credit		-	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)	(16,910)
Total State Tax		9,003	807	243	(295)	(810)	(1,304)	(1,778)	(2,233)	(2,679)	(3,122)	(3,566)	12,872	12,373	11,874	11,374	10,875	10,376	9,876	9,377	8,878
Total Taxes		38,543	58,942	56,528	54,222	52,016	49,902	47,874	45,924	44,018	42,119	40,219	55,110	52,972	50,835	48,697	46,559	44,421	42,283	40,145	38,007
Revenue Requirement Calculation																					
Revenue Requirement		229,866	510,679	497,847	485,611	473,929	462,760	452,065	441,811	431,806	421,844	411,891	419,854	408,614	397,383	386,162	374,951	363,750	352,559	341,378	330,207
Revenue Taxes		20,424	45,374	44,234	43,147	42,109	41,116	40,166	39,255	38,366	37,481	36,597	37,304	36,305							

Revenue Requirements Model - Calculations																					
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Manual input																					
Accumulated deferred tax asset	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deferred Tax Calculation - Depreciation																					
Book Accumulated Depreciation	1,725,504	1,811,779	1,898,054	1,984,330	2,070,605	2,156,880	2,243,155	2,329,431	2,415,706	2,501,981	2,588,256	2,674,531	2,760,807	2,847,082	2,933,357	3,019,632	3,105,907	3,192,183	3,278,458	3,364,733	3,451,008
Tax Accumulated Depreciation	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485
Book/Tax Acc Depr Difference	(2,501,981)	(2,415,706)	(2,329,431)	(2,243,155)	(2,156,880)	(2,070,605)	(1,984,330)	(1,898,054)	(1,811,779)	(1,725,504)	(1,639,229)	(1,552,954)	(1,466,678)	(1,380,403)	(1,294,128)	(1,207,853)	(1,121,578)	(1,035,302)	(949,027)	(862,752)	(776,477)
Deferred ITC	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Net Deferred Tax Asset (Liability)	(644,307)	(622,090)	(599,872)	(577,655)	(555,437)	(533,220)	(511,002)	(488,785)	(466,567)	(444,350)	(422,132)	(399,915)	(377,697)	(355,480)	(333,262)	(311,045)	(288,827)	(266,610)	(244,392)	(222,175)	(199,957)
Deferred Tax Base	8,040	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)	(86,275)
Deferred Taxes - Federal	1,587	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)	(17,028)
Deferred Taxes - State excluding credit	484	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)	(5,189)
Change in Deferred Taxes	2,070	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)	(22,217)
Accumulated Deferred Taxes	644,307	622,090	599,872	577,655	555,437	533,220	511,002	488,785	466,567	444,350	422,132	399,915	377,697	355,480	333,262	311,045	288,827	266,610	244,392	222,175	199,957
Change in Deferred ITC	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rate Base and Financing																					
Investment: (Rate Base)																					
Land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Plant	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485
Accumulated Depreciation	1,725,504	1,811,779	1,898,054	1,984,330	2,070,605	2,156,880	2,243,155	2,329,431	2,415,706	2,501,981	2,588,256	2,674,531	2,760,807	2,847,082	2,933,357	3,019,632	3,105,907	3,192,183	3,278,458	3,364,733	3,451,008
CIAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated Deferred Taxes	644,307	622,090	599,872	577,655	555,437	533,220	511,002	488,785	466,567	444,350	422,132	399,915	377,697	355,480	333,262	311,045	288,827	266,610	244,392	222,175	199,957
Accumulated Deferred ITC	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Ending Net Investment	1,857,674	1,793,616	1,729,558	1,665,501	1,601,443	1,537,385	1,473,327	1,409,270	1,345,212	1,281,154	1,217,097	1,153,039	1,088,981	1,024,923	960,866	896,808	832,750	768,693	704,635	640,577	576,519
Average Net Investment	1,901,847	1,825,645	1,761,587	1,697,530	1,633,472	1,569,414	1,505,356	1,441,299	1,377,241	1,313,183	1,249,125	1,185,068	1,121,010	1,056,952	992,895	928,837	864,779	800,721	736,664	672,606	608,548
Average Financing:																					
Short Term Debt	22,516	21,614	20,855	20,097	19,339	18,580	17,822	17,064	16,305	15,547	14,788	14,030	13,272	12,513	11,755	10,996	10,238	9,480	8,721	7,963	7,205
Long Term Debt (Taxable Debt)	753,029	722,857	697,494	672,131	646,767	621,404	596,040	570,677	545,314	519,950	494,587	469,223	443,860	418,496	393,133	367,770	342,406	317,043	291,679	266,316	240,952
Hybrids	23,230	22,299	21,517	20,735	19,952	19,170	18,387	17,605	16,822	16,040	15,258	14,475	13,693	12,910	12,128	11,345	10,563	9,780	8,998	8,216	7,433
Preferred Stock	17,138	16,451	15,874	15,297	14,720	14,142	13,565	12,988	12,411	11,833	11,256	10,679	10,102	9,524	8,947	8,370	7,793	7,215	6,638	6,061	5,484
Common Equity	1,085,933	1,042,423	1,005,847	969,271	932,694	896,118	859,542	822,966	786,389	749,813	713,237	676,661	640,084	603,508	566,932	530,356	493,779	457,203	420,627	384,051	347,474
Total Financing	1,901,847	1,825,645	1,761,587	1,697,530	1,633,472	1,569,414	1,505,356	1,441,299	1,377,241	1,313,183	1,249,125	1,185,068	1,121,010	1,056,952	992,895	928,837	864,779	800,721	736,664	672,606	608,548
Return on Investment																					
Short Term Debt	394	378	365	352	338	325	312	299	285	272	259	246	232	219	206	192	179	166	153	139	126
Long Term Debt (Taxable Debt)	37,877	36,360	35,084	33,808	32,532	31,257	29,981	28,705	27,429	26,153	24,878	23,602	22,326	21,050	19,775	18,499	17,223	15,947	14,671	13,396	12,120
Hybrids	1,670	1,603	1,547	1,491	1,435	1,378	1,322	1,266	1,210	1,153	1,097	1,041	985	928	872	816	759	703	647	591	534
Total Interest Expense	39,942	38,341	36,996	35,651	34,305	32,960	31,615	30,269	28,924	27,579	26,234	24,888	23,543	22,198	20,852	19,507	18,162	16,816	15,471	14,126	12,780
Preferred Dividends	920	883	852	821	790	759	728	697	666	635	604	573	542	511	480	449	418	387	356	325	294
Net Income on Common	103,164	99,030	95,555	92,081	88,606	85,131	81,656	78,182	74,707	71,232	67,757	64,283	60,808	57,333	53,859	50,384	46,909	43,434	39,960	36,485	33,010
Income Taxes																					
Income Before Pref Dividends	104,084	99,914	96,408	92,902	89,396	85,891	82,385	78,879	75,373	71,868	68,362	64,856	61,350	57,845	54,339	50,833	47,328	43,822	40,316	36,810	33,305
Income Before Taxes (including ITC)	140,184	134,567	129,846	125,124	120,402	115,681	110,959	106,237	101,516	96,794	92,072	87,351	82,629	77,907	73,186	68,464	63,742	59,021	54,299	49,577	44,856
Investment Tax Credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Income Before Taxes (excluding ITC)	140,184	134,567	129,846	125,124	120,402	115,681	110,959	106,237	101,516	96,794	92,072	87,351	82,629	77,907	73,186	68,464	63,742	59,021	54,299	49,577	44,856
Federal Income Tax	27,668	26,559	25,627	24,696	23,764	22,832	21,900	20,968	20,036	19,104	18,172	17,240	16,308	15,376	14,445	13,513	12,581	11,649	10,717	9,785	8,853
State Income Tax	8,432	8,094	7,810	7,526	7,242	6,958	6,674	6,390	6,106	5,822	5,538	5,254	4,970	4,686	4,402	4,118	3,834	3,550	3,266	2,982	2,698
State Investment Tax Credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total State Tax	8,432	8,094	7,810	7,526	7,242	6,958	6,674	6,390	6,106	5,822	5,538	5,254	4,970	4,686	4,402	4,118	3,834	3,550	3,266	2,982	2,698
Total Taxes	36,100	34,654	33,438	32,222	31,006	29,790	28,574	27,358	26,142	24,926	23,710	22,494	21,279	20,063	18,847	17,631	16,415	15,199	13,983	12,767	11,551
Revenue Requirement Calculation																					
Revenue Requirement	320,310	312,948	306,859	300,781	294,716	288,662	282,620	276,591	270,574	264,570	258,579	252,601	246,637	240,687	234,751	228,829	222,923	217,031	211,155	205,294	199,449
Revenue Taxes	28,460	27,805	27,264	26,724	26,185	25,648	25,111	24,575	24,040	23,507	22,975	22,444	21,914	21,385	20,858	20,331	19,807	19,283	18,761	18,240	17,721
Income Before Depr. Int. Inc Tax	291,850	285,142	279,594	274,057	268,530	263,014	257,509	252,015	246,533	241,063	235,604	230,157	224,723	219,302	213,893	208,498	203,116	197,748	192,394	187,054	181,728
Depreciation Expense	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275
CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O&M	25,450	25,959	26,478	27,007	27,547	28,098	28,660	29,234	29,818	30,415	31,023	31,643	32,276	32,922	33,580	34,252	34,937	35,636	36,348	37,075	37,817
Interest Expense	39,942	38,341	36,996	35,651	34,305	32,960	31,615	30,269	28,924	27,579	26,234	24,888	23,543	22,198	20,852	19,507	18,162	16,816	15,471	14,126	12,780
Income Before Income Taxes	140,184	134,567	129,846	125,124	120,402	115,681	110,959	106,237	101,516	96,794	92,072	87,351									

AES-CEIP 1 138KV OH vs UG																				
Revenue Requirements Model - Calculations																				
	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	Total
Manual input																				
O&M																				
Escalation Rate	2.25	2.30	2.34	2.39	2.44	2.49	2.54	2.59	2.64	2.69	2.75	2.80	2.86	2.91	2.97	3.03	3.09	3.15	3.22	
O&M	38,573	39,344	40,131	40,934	41,753	42,588	43,439	44,308	45,194	46,098	47,020	47,961	48,920	49,898	50,896	51,914	52,953	54,012	55,092	1,953,340
Plant Asset Depreciation																				
Book Depreciation																				
Book Depreciation Rates - UG Conduit	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	100.000%
Book Depreciation Rates - UG Cond. & Dev.	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	100.000%
Book Depreciation Rates - Poles & Fix.	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Book Depreciation Rates - OH Cond. & Dev.	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Book Depreciation Rates - DIST: Poles, Towers & Fix.	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	100.000%
Book Depreciation Rates - DIST: OH Cond. & Dev.	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
R Book Depreciation Rates - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	18.367%
R Book Depreciation Rates - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	18.367%
R Book Depreciation Rates - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	16.000%
Depreciation Expense	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	86,275	-	236,862	236,862	236,862	236,862	236,862	236,862	236,862	236,862	236,862	6,359,240
Accumulated Depreciation	3,537,283	3,623,559	3,709,834	3,796,109	3,882,384	3,968,659	4,054,935	4,141,210	4,227,485	4,227,485	4,464,347	4,701,208	4,938,070	5,174,932	5,411,793	5,648,655	5,885,517	6,122,378	6,359,240	
Bonus																				
Tax Depreciation																				
Tax Depreciation Rates (SL) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
R Tax Depreciation Rates (SL) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	1.667%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	31.664%
R Tax Depreciation Rates (SL) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	1.667%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	31.664%
R Tax Depreciation Rates (SL) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	1.667%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	28.331%
Revenue Bond Financed Tax Basis (S/L)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tax Depreciation Rates (MACRS) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
R Tax Depreciation Rates (MACRS) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	3.750%	7.219%	6.677%	6.177%	5.713%	5.285%	4.888%	4.522%	4.462%	53.154%
R Tax Depreciation Rates (MACRS) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	3.750%	7.219%	6.677%	6.177%	5.713%	5.285%	4.888%	4.522%	4.462%	53.154%
R Tax Depreciation Rates (MACRS) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	3.750%	7.219%	6.677%	6.177%	5.713%	5.285%	4.888%	4.522%	4.462%	48.693%
NonRB Financed Tax Basis (MACRS)	-	-	-	-	-	-	-	-	-	435,233	837,853	774,947	716,916	663,063	613,389	567,312	524,833	517,870	517,754	10,396,656
Tax Depreciation	-	-	-	-	-	-	-	-	-	435,233	837,853	774,947	716,916	663,063	613,389	567,312	524,833	517,870	517,754	10,396,656
Accumulated Tax Depreciation	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,227,485	4,662,718	5,500,571	6,275,519	6,992,435	7,655,498	8,268,887	8,836,199	9,361,033	9,878,902	10,396,656	
State Investment Tax Credit (ITC)																				
Book																				
State ITC Amortization Rate - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - DIST																				

AES-CEIP 1 138KV OH vs UG		Underground																			
Revenue Requirements Model - Calculations																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Manual input																					
O&M																					
Escalation Rate	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22	1.24	1.27	1.29	1.32	1.35	1.37	1.40	1.43	1.46	1.49
O&M	12,026	12,266	12,512	12,762	13,017	13,277	13,543	13,814	14,090	14,372	14,659	14,953	15,252	15,557	15,868	16,185	16,509	16,839	17,176	17,519	17,870
Plant Asset Depreciation																					
Book Depreciation																					
Book Depreciation Rates - UG Conduit	0.000%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%
Book Depreciation Rates - UG Cond. & Dev.	0.000%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%
Book Depreciation Rates - Poles & Fix.	0.000%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%
Book Depreciation Rates - OH Cond. & Dev.	0.000%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%
Book Depreciation Rates - DIST: Poles, Towers & Fix.	0.000%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%
Book Depreciation Rates - DIST: OH Cond. & Dev.	0.000%	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%
R Book Depreciation Rates - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Depreciation Expense	-	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620
Accumulated Depreciation	-	276,620	553,240	829,861	1,106,481	1,383,101	1,659,721	1,936,342	2,212,962	2,489,582	2,766,202	3,042,823	3,319,443	3,596,063	3,872,683	4,149,303	4,425,924	4,702,544	4,979,164	5,255,784	5,532,405
Bonus	0%																				
Tax Depreciation																					
Tax Depreciation Rates (SL) - UG Conduit	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%
Tax Depreciation Rates (SL) - UG Cond. & Dev.	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%
Tax Depreciation Rates (SL) - Poles & Fix.	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%
Tax Depreciation Rates (SL) - OH Cond. & Dev.	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%
Tax Depreciation Rates (SL) - DIST: Poles, Towers & Fix.	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%
Tax Depreciation Rates (SL) - DIST: OH Cond. & Dev.	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%
R Tax Depreciation Rates (SL) - UG Conduit	30	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - UG Cond. & Dev.	30	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - Poles & Fix.	30	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - OH Cond. & Dev.	30	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - DIST: Poles, Towers & Fix.	30	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - DIST: OH Cond. & Dev.	30	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Revenue Bond Financed Tax Basis (SL)	0.0%																				
Tax Depreciation Rates (MACRS) - UG Conduit	20	3.750%	7.219%	6.677%	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%
Tax Depreciation Rates (MACRS) - UG Cond. & Dev.	20	3.750%	7.219%	6.677%	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%
Tax Depreciation Rates (MACRS) - Poles & Fix.	20	3.750%	7.219%	6.677%	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%
Tax Depreciation Rates (MACRS) - OH Cond. & Dev.	20	3.750%	7.219%	6.677%	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%
Tax Depreciation Rates (MACRS) - DIST: Poles, Towers & Fix.	20	3.750%	7.219%	6.677%	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%
Tax Depreciation Rates (MACRS) - DIST: OH Cond. & Dev.	20	3.750%	7.219%	6.677%	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%
R Tax Depreciation Rates (MACRS) - UG Conduit	20	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - UG Cond. & Dev.	20	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - Poles & Fix.	20	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - OH Cond. & Dev.	20	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - DIST: Poles, Towers & Fix.	20	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - DIST: OH Cond. & Dev.	20	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
NonRB Financed Tax Basis (MACRS)	100.0%	605,840	1,166,283	1,078,719	997,940	922,977	853,831	789,693	730,563	720,869	720,708	720,869	720,708	720,869	720,708	720,869	720,708	720,869	720,708	720,869	720,708
Tax Depreciation		605,840	1,166,283	1,078,719	997,940	922,977	853,831	789,693	730,563	720,869	720,708	720,869	720,708	720,869	720,708	720,869	720,708	720,869	720,708	720,869	720,708
Accumulated Tax Depreciation		605,840	1,772,123	2,850,842	3,848,782	4,771,759	5,625,590	6,415,282	7,145,845	7,866,714	8,587,422	9,308,291	10,028,998	10,749,867	11,470,575	12,191,444	12,912,151	13,633,020	14,353,728	15,074,597	15,795,304
State Investment Tax Credit (ITC)																					
Book																					
State ITC Amortization Rate - UG Conduit		0.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
State ITC Amortization Rate - UG Cond. & Dev.		0.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
State ITC Amortization Rate - Poles & Fix.		0.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
State ITC Amortization Rate - OH Cond. & Dev.		0.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	10.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
State ITC Amortization Rate - DIST: Poles, Towers & Fix.		0.000%	10.000%	10.000%</																	

Revenue Requirements Model - Calculations																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
Manual input																						
Deferred ITC	646,230	581,607	516,984	452,361	387,738	323,115	258,492	193,869	129,246	64,623	-	-	-	-	-	-	-	-	-	-		
Net Deferred Tax Asset (Liability)	10,401	(235,345)	(458,543)	(660,938)	(844,028)	(1,009,312)	(1,158,080)	(1,291,620)	(1,422,664)	(1,553,667)	(1,684,711)	(1,799,072)	(1,913,474)	(2,027,835)	(2,142,237)	(2,256,598)	(2,371,000)	(2,485,361)	(2,599,764)	(2,714,125)	(2,735,708)	
Deferred Tax Base	(40,389)	954,286	866,721	785,943	710,980	641,834	577,695	518,565	508,872	508,710	508,872	444,087	444,249	444,087	444,249	444,087	444,249	444,087	444,249	444,087	83,814	
Deferred Taxes - Federal	(7,972)	188,346	171,063	155,120	140,325	126,678	114,019	102,348	100,435	100,403	100,435	87,649	87,681	87,649	87,681	87,649	87,681	87,649	87,681	87,649	16,542	
Deferred Taxes - State excluding credit	(2,429)	57,401	52,134	47,275	42,766	38,607	34,749	31,192	30,609	30,599	30,609	26,712	26,722	26,712	26,722	26,712	26,722	26,712	26,722	26,712	5,041	
Change in Deferred Taxes	(10,401)	245,746	223,197	202,395	183,091	165,284	148,767	133,540	131,044	131,002	131,044	114,361	114,402	114,361	114,402	114,361	114,402	114,361	114,402	114,361	21,584	
Accumulated Deferred Taxes	(10,401)	235,345	458,543	660,938	844,028	1,009,312	1,158,080	1,291,620	1,422,664	1,553,667	1,684,711	1,799,072	1,913,474	2,027,835	2,142,237	2,256,598	2,371,000	2,485,361	2,599,764	2,714,125	2,735,708	
Change in Deferred ITC	646,230	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	-	-	-	-	-	-	-	-	-	-	
check	646,230	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	-	-	-	-	-	-	-	-	-	-	
Rate Base and Financing																						
Investment: (Rate Base)																						
Land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gross Plant	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	
Accumulated Depreciation	-	276,620	553,240	829,861	1,106,481	1,383,101	1,659,721	1,936,342	2,212,962	2,489,582	2,766,202	3,042,823	3,319,443	3,596,063	3,872,683	4,149,303	4,425,924	4,702,544	4,979,164	5,255,784	5,532,405	
CIAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Accumulated CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Accumulated Deferred Taxes	(10,401)	235,345	458,543	660,938	844,028	1,009,312	1,158,080	1,291,620	1,422,664	1,553,667	1,684,711	1,799,072	1,913,474	2,027,835	2,142,237	2,256,598	2,371,000	2,485,361	2,599,764	2,714,125	2,735,708	
Accumulated Deferred ITC	646,230	581,607	516,984	452,361	387,738	323,115	258,492	193,869	129,246	64,623	-	-	-	-	-	-	-	-	-	-	-	
Ending Net Investment	-	15,519,910	15,062,167	14,626,972	14,212,580	13,817,492	13,440,211	13,079,446	12,733,908	12,390,867	12,047,867	11,704,826	11,313,845	10,922,822	10,531,841	10,140,819	9,749,838	9,358,815	8,967,834	8,576,811	8,185,830	7,887,626
Average Net Investment	-	7,759,955	15,291,039	14,844,570	14,419,776	14,015,036	13,628,851	13,259,828	12,906,677	12,562,388	12,219,367	11,876,347	11,509,335	11,118,334	10,727,332	10,336,330	9,945,328	9,554,326	9,163,324	8,772,322	8,381,321	8,036,728
Average Financing:																						
Short Term Debt	1.18%	91,870	181,030	175,745	170,715	165,924	161,352	156,983	152,802	148,726	144,665	140,604	136,259	131,630	127,001	122,372	117,743	113,113	108,484	103,855	99,226	95,147
Long Term Debt (Taxable Debt)	39.59%	3,072,526	6,054,431	5,877,653	5,709,458	5,549,202	5,396,294	5,250,181	5,110,352	4,974,032	4,838,214	4,702,396	4,557,079	4,402,264	4,247,448	4,092,632	3,937,816	3,783,001	3,628,185	3,473,369	3,318,553	3,182,113
Hybrids	1.22%	94,785	186,773	181,320	176,131	171,188	166,471	161,963	157,650	153,444	149,254	145,064	140,882	135,806	131,030	126,254	121,478	116,702	111,926	107,150	102,374	98,165
Preferred Stock	0.90%	69,926	137,790	133,767	129,939	126,292	122,812	119,487	116,304	113,202	110,111	107,200	103,713	100,189	96,666	93,143	89,619	86,096	82,572	79,049	75,526	72,420
Common Equity	57.10%	4,430,848	8,731,013	8,476,085	8,233,532	8,002,430	7,781,923	7,571,215	7,369,570	7,172,984	6,977,123	6,781,262	6,571,703	6,348,445	6,125,187	5,901,930	5,678,672	5,455,414	5,232,157	5,008,899	4,785,641	4,588,883
Total Financing	-	7,759,955	15,291,039	14,844,570	14,419,776	14,015,036	13,628,851	13,259,828	12,906,677	12,562,388	12,219,367	11,876,347	11,509,335	11,118,334	10,727,332	10,336,330	9,945,328	9,554,326	9,163,324	8,772,322	8,381,321	8,036,728
Return on Investment																						
Short Term Debt	1.75%	1,608	3,168	3,076	2,988	2,904	2,824	2,747	2,674	2,603	2,532	2,461	2,385	2,304	2,223	2,142	2,060	1,979	1,898	1,817	1,736	1,665
Long Term Debt (Taxable Debt)	5.03%	154,548	304,538	295,646	287,186	279,125	271,434	264,084	257,051	250,194	243,362	236,531	229,221	221,434	213,647	205,859	198,072	190,285	182,498	174,710	166,923	160,060
Hybrids	7.19%	6,815	13,429	13,037	12,664	12,308	11,969	11,645	11,335	11,033	10,731	10,430	10,108	9,764	9,421	9,078	8,734	8,391	8,047	7,704	7,361	7,058
Total Interest Expense	-	162,971	321,135	311,758	302,837	294,337	286,226	278,476	271,060	263,829	256,625	249,421	241,713	233,502	225,290	217,079	208,867	200,655	192,444	184,232	176,020	168,783
Preferred Dividends	5.37%	3,755	7,399	7,183	6,978	6,782	6,595	6,416	6,246	6,079	5,913	5,747	5,569	5,380	5,191	5,002	4,813	4,623	4,434	4,245	4,056	3,889
Net Income on Common	9.50%	420,931	829,446	805,228	782,186	760,231	739,283	719,265	700,109	681,433	662,827	644,220	624,312	603,102	581,893	560,683	539,474	518,264	497,055	475,845	454,636	435,944
Income Taxes																						
Income Before Pref Dividends	-	424,686	836,846	812,411	789,163	767,013	745,878	725,682	706,355	687,512	668,740	649,967	629,881	608,482	587,084	565,685	544,286	522,888	501,489	480,090	458,692	439,833
Income Before Taxes (including ITC)	-	571,982	1,127,093	1,094,184	1,062,873	1,033,040	1,004,575	977,374	951,343	925,966	900,682	875,398	848,346	819,526	790,705	761,885	733,064	704,244	675,423	646,603	617,782	592,382
Investment Tax Credit	-	-	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623	64,623
Income Before Taxes (excluding ITC)	-	571,982	1,062,470	1,029,561	998,250	968,417	939,952	912,751	886,721	861,343	836,059	810,775	784,346	757,882	731,419	704,956	678,493	652,030	625,567	599,104	572,641	546,178
Federal Income Tax	-	112,891	222,453	215,957	209,778	203,889	198,271	192,903	187,765	182,756	177,766	172,776	167,786	162,796	157,806	152,816	147,826	142,836	137,846	132,856	127,866	122,876
State Income Tax	-	34,405	67,795	65,816	63,932	62,138	60,426	58,789	57,224	55,697	54,176	52,656	51,028	49,295	47,561	45,828	44,094	42,361	40,627	38,893	37,160	35,632
State Investment Tax Credit	-	-	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)	(64,623)
Total State Tax	-	34,405	3,172	1,193	(691)	(2,485)	(4,197)	(5,834)	(7,399)	(8,926)	(10,447)	(11,967)	(13,487)	(15,007)	(16,527)	(18,047)	(19,567)	(21,087)	(22,607)	(24,127)	(25,647)	(27,167)
Total Taxes	-	147,296	225,625	217,150	209,087	201,404	194,074	187,069	180,366	173,831	167,320	160,809	154,298	147,787	141,276	134,765	128,254	121,743	115,232	108,721	102,210	95,699
Revenue Requirement Calculation																						
Revenue Requirement	-	819,819	1,835,583	1,789,444	1,745,563	1,703,771	1,663,915	1,625,847	1,589,436	1,553,951	1,518,605	1,483,264	1,516,361	1,476,046	1,435,738	1,395,436	1,355,141	1,314,853	1,274,572	1,234,298	1,194,032	1,158,597
Revenue Taxes	-	72,841	163,092	158,992	155,093	151,380	147,839	144,457	141,221	138,069	134,928	131,788	134,729	131,147	127,565	123,984	120,404	116,825	113,246	109,667	106,090	102,941
Income Before Depr., Int., Inc Tax	-	746,978	1,672,492	1,630,452	1,590,469	1,552,391	1,516,076	1,481,391	1,448,214	1,415,883	1,383,677	1,351,476	1,381,633	1,344,899	1,308,172	1,271,451	1,234,736	1,198,028	1,161,326	1,124,631	1,087,942	1,055,656
Depreciation Expense	-	-	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620
CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O&M	-	12,026	12,266	12,512	12,762	13,017	13,277	13,543	13,814	14,090	14,372	14,659	14,953	15,252	15,557	15,868	16,185	16,509	16,839	17,176	17,519	17,870
Interest Expense	-	162,971	321,135	311,758	302,837	294,337	286,226	278,476	271,060	2												

Revenue Requirements Model - Calculations																					
	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Manual input																					
Deferred ITC																					
Net Deferred Tax Asset (Liability)	(2,664,473)	(2,593,238)	(2,522,004)	(2,450,769)	(2,379,534)	(2,308,299)	(2,237,064)	(2,165,829)	(2,094,594)	(2,023,359)	(1,952,124)	(1,880,889)	(1,809,654)	(1,738,420)	(1,667,185)	(1,595,950)	(1,524,715)	(1,453,480)	(1,382,245)	(1,311,010)	(1,239,775)
Deferred Tax Base	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)
Deferred Taxes - Federal	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)
Deferred Taxes - State excluding credit	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)
Change in Deferred Taxes	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)
Accumulated Deferred Taxes	2,664,473	2,593,238	2,522,004	2,450,769	2,379,534	2,308,299	2,237,064	2,165,829	2,094,594	2,023,359	1,952,124	1,880,889	1,809,654	1,738,420	1,667,185	1,595,950	1,524,715	1,453,480	1,382,245	1,311,010	1,239,775
check	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Change in Deferred ITC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rate Base and Financing																					
Investment: (Rate Base)																					
Land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Plant	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739
Accumulated Depreciation	5,809,025	6,085,645	6,362,265	6,638,885	6,915,506	7,192,126	7,468,746	7,745,366	8,021,987	8,298,607	8,575,227	8,851,847	9,128,468	9,405,088	9,681,708	9,958,328	10,234,948	10,511,569	10,788,189	11,064,809	11,341,429
CIAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated Deferred Taxes	2,664,473	2,593,238	2,522,004	2,450,769	2,379,534	2,308,299	2,237,064	2,165,829	2,094,594	2,023,359	1,952,124	1,880,889	1,809,654	1,738,420	1,667,185	1,595,950	1,524,715	1,453,480	1,382,245	1,311,010	1,239,775
Accumulated Deferred ITC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ending Net Investment	7,682,241	7,476,855	7,271,470	7,066,085	6,860,700	6,655,314	6,449,929	6,244,544	6,039,158	5,833,773	5,628,388	5,423,002	5,217,617	5,012,232	4,806,846	4,601,461	4,396,076	4,190,690	3,985,305	3,779,920	3,574,534
Average Net Investment	7,784,933	7,579,548	7,374,163	7,168,778	6,963,392	6,758,007	6,552,622	6,347,236	6,141,851	5,936,466	5,731,080	5,525,695	5,320,310	5,114,924	4,909,539	4,704,154	4,498,768	4,293,383	4,087,998	3,882,612	3,677,227
Average Financing:																					
Short Term Debt	92,166	89,734	87,303	84,871	82,439	80,008	77,576	75,145	72,713	70,282	67,850	65,419	62,987	60,555	58,124	55,692	53,261	50,829	48,398	45,966	43,535
Long Term Debt (Taxable Debt)	3,082,416	3,001,094	2,919,773	2,838,451	2,757,130	2,675,808	2,594,487	2,513,165	2,431,843	2,350,522	2,269,200	2,187,879	2,106,557	2,025,236	1,943,914	1,862,592	1,781,271	1,699,949	1,618,628	1,537,306	1,455,985
Hybrids	95,090	92,581	90,072	87,564	85,055	82,546	80,037	77,529	75,020	72,511	70,003	67,494	64,985	62,477	59,968	57,459	54,951	52,442	49,933	47,424	44,916
Preferred Stock	70,151	68,301	66,450	64,599	62,748	60,898	59,047	57,196	55,345	53,495	51,644	49,793	47,942	46,092	44,241	42,390	40,539	38,688	36,838	34,987	33,136
Common Equity	4,445,111	4,327,838	4,210,565	4,093,292	3,976,020	3,858,747	3,741,474	3,624,201	3,506,929	3,389,656	3,272,383	3,155,111	3,037,838	2,920,565	2,803,292	2,686,020	2,568,747	2,451,474	2,334,201	2,216,929	2,099,656
Total Financing	7,784,933	7,579,548	7,374,163	7,168,778	6,963,392	6,758,007	6,552,622	6,347,236	6,141,851	5,936,466	5,731,080	5,525,695	5,320,310	5,114,924	4,909,539	4,704,154	4,498,768	4,293,383	4,087,998	3,882,612	3,677,227
Return on Investment																					
Short Term Debt	1,613	1,570	1,528	1,485	1,443	1,400	1,358	1,315	1,272	1,230	1,187	1,145	1,102	1,060	1,017	975	932	890	847	804	762
Long Term Debt (Taxable Debt)	155,046	150,955	146,865	142,774	138,684	134,593	130,503	126,412	122,322	118,231	114,141	110,050	105,960	101,869	97,779	93,688	89,598	85,507	81,417	77,327	73,236
Hybrids	6,837	6,657	6,476	6,296	6,115	5,935	5,755	5,574	5,394	5,214	5,033	4,853	4,672	4,492	4,312	4,131	3,951	3,771	3,590	3,410	3,229
Total Interest Expense	163,495	159,182	154,869	150,555	146,242	141,928	137,615	133,302	128,988	124,675	120,361	116,048	111,735	107,421	103,108	98,794	94,481	90,168	85,854	81,541	77,227
Preferred Dividends	3,767	3,668	3,568	3,469	3,370	3,270	3,171	3,071	2,972	2,873	2,773	2,674	2,575	2,475	2,376	2,276	2,177	2,078	1,978	1,879	1,779
Net Income on Common	422,286	411,145	400,004	388,863	377,722	366,581	355,440	344,299	333,158	322,017	310,876	299,736	288,595	277,454	266,313	255,172	244,031	232,890	221,749	210,608	199,467
Income Taxes																					
Income Before Pref Dividends	426,053	414,812	403,572	392,332	381,091	369,851	358,611	347,371	336,130	324,890	313,650	302,409	291,169	279,929	268,688	257,448	246,208	234,968	223,727	212,487	201,247
Income Before Taxes (including ITC)	573,823	558,684	543,545	528,406	513,267	498,129	482,990	467,851	452,712	437,573	422,435	407,296	392,157	377,018	361,879	346,740	331,602	316,463	301,324	286,185	271,046
Investment Tax Credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Income Before Taxes (excluding ITC)	573,823	558,684	543,545	528,406	513,267	498,129	482,990	467,851	452,712	437,573	422,435	407,296	392,157	377,018	361,879	346,740	331,602	316,463	301,324	286,185	271,046
Federal Income Tax	113,255	110,267	107,279	104,291	101,303	98,315	95,327	92,339	89,351	86,363	83,375	80,387	77,399	74,411	71,424	68,436	65,448	62,460	59,472	56,484	53,496
State Income Tax	34,516	33,605	32,694	31,784	30,873	29,963	29,052	28,141	27,231	26,320	25,410	24,499	23,588	22,678	21,767	20,857	19,946	19,035	18,125	17,214	16,304
State Investment Tax Credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total State Tax	34,516	33,605	32,694	31,784	30,873	29,963	29,052	28,141	27,231	26,320	25,410	24,499	23,588	22,678	21,767	20,857	19,946	19,035	18,125	17,214	16,304
Total Taxes	147,770	143,872	139,973	136,075	132,176	128,277	124,379	120,480	116,582	112,683	108,785	104,886	100,988	97,089	93,191	89,292	85,394	81,495	77,597	73,698	69,799
Revenue Requirement Calculation																					
Revenue Requirement	1,132,816	1,111,867	1,090,926	1,069,993	1,049,069	1,028,153	1,007,245	986,347	965,457	944,577	923,706	902,845	881,993	861,151	840,320	819,499	798,688	777,888	757,099	736,322	715,555
Revenue Taxes	100,651	98,789	96,929	95,069	93,210	91,351	89,494	87,637	85,781	83,926	82,071	80,218	78,365	76,513	74,662	72,812	70,963	69,115	67,268	65,422	63,577
Income Before Depr., Int., Inc Tax	1,032,166	1,013,078	993,997	974,924	955,859	936,801	917,752	898,710	879,677	860,651	841,635	822,627	803,628	784,638	765,657	746,686	727,725	708,773	689,831	670,899	651,978
Depreciation Expense	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620
CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O&M	18,227	18,592	18,963	19,343	19,730	20,124	20,527	20,937	21,356	21,783	22,219	22,663	23,116	23,579	24,050	24,531	25,022	25,522	26,033	26,553	27,085
Interest Expense	163,495	159,182	154,869	150,555	146,242	141,928	137,615	133,302	128,988	124,675	120,361	116,048	111,735	107,421	103,108	98,794	94,481	90,168	85,854	81,541	77,227
Income Before Income Taxes	573,823	558,684	543,545	528,406	513,267	498,129	482,990	467,851	452,712	437,573	422,435	407,296	392,157	377,018	361,879	346,740	331,602	316,463	301,324	286,185	271,046
Income Taxes - Federal	113,255	110,267	107,279	104,291	101,303	98,315	95,327	92,339	89,351	86,363	83,375	80,387	77,399	74,411	71,424	68,436	65,448	62,460	59,472	56,484	53,496
Income Taxes - State	34,516	33,605	32,694	31,784	30,873	29,963	29,052	28,141	27,231	26,320	25,410	24,499	23,588	22,678	21,767	20,857	19,946	19,035	18,125	17,214	

AES-CEIP 1 138KV OH vs UG																			
Revenue Requirements Model - Calculations																			
	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	Total
Manual input																			
O&M																			
Escalation Rate	2.30	2.34	2.39	2.44	2.49	2.54	2.59	2.64	2.69	2.75	2.80	2.86	2.91	2.97	3.03	3.09	3.15	3.22	
O&M	27,626	28,179	28,742	29,317	29,903	30,502	31,112	31,734	32,368	33,016	33,676	34,350	35,037	35,737	36,452	37,181	37,925	38,683	1,371,561
Plant Asset Depreciation																			
Book Depreciation																			
Book Depreciation Rates - UG Conduit	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	100.000%
Book Depreciation Rates - UG Cond. & Dev.	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	100.000%
Book Depreciation Rates - Poles & Fix.	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Book Depreciation Rates - OH Cond. & Dev.	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Book Depreciation Rates - DIST: Poles, Towers & Fix.	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	1.695%	100.000%
Book Depreciation Rates - DIST: OH Cond. & Dev.	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
R Book Depreciation Rates - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	18.367%
R Book Depreciation Rates - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	2.041%	18.367%
R Book Depreciation Rates - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Book Depreciation Rates - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	2.000%	16.000%
Depreciation Expense	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	260,135	305,394	305,394	305,394	305,394	305,394	305,394	305,394	305,394	305,394	16,563,074
Accumulated Depreciation	11,618,050	11,894,670	12,171,290	12,447,910	12,724,531	13,001,151	13,277,771	13,554,391	13,814,526	14,119,920	14,425,314	14,730,709	15,036,103	15,341,497	15,646,892	15,952,286	16,257,680	16,563,074	
Bonus																			
Tax Depreciation																			
Tax Depreciation Rates (SL) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (SL) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
R Tax Depreciation Rates (SL) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	1.667%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	31.664%
R Tax Depreciation Rates (SL) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	1.667%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	31.664%
R Tax Depreciation Rates (SL) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (SL) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	1.667%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	3.333%	28.331%
Revenue Bond Financed Tax Basis (SL)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tax Depreciation Rates (MACRS) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
Tax Depreciation Rates (MACRS) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
R Tax Depreciation Rates (MACRS) - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	3.750%	7.219%	6.677%	6.177%	5.713%	5.285%	4.888%	4.522%	4.462%	53.154%
R Tax Depreciation Rates (MACRS) - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	3.750%	7.219%	6.677%	6.177%	5.713%	5.285%	4.888%	4.522%	4.462%	53.154%
R Tax Depreciation Rates (MACRS) - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R Tax Depreciation Rates (MACRS) - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	3.750%	7.219%	6.677%	6.177%	5.713%	5.285%	4.888%	4.522%	48.693%
NonRB Financed Tax Basis (MACRS)	-	-	-	-	-	-	-	-	83,164	160,097	148,077	136,988	126,698	117,206	108,402	100,285	98,954	98,932	17,334,543
Tax Depreciation	-	-	-	-	-	-	-	-	83,164	160,097	148,077	136,988	126,698	117,206	108,402	100,285	98,954	98,932	17,334,543
Accumulated Tax Depreciation	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,238,903	16,399,000	16,547,077	16,684,065	16,810,763	16,927,969	17,036,371	17,136,656	17,235,611	17,334,543	
State Investment Tax Credit (ITC)																			
Book																			
State ITC Amortization Rate - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - UG Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - Poles & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - DIST: Poles, Towers & Fix.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
State ITC Amortization Rate - DIST: OH Cond. & Dev.	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	100.000%
R State ITC Amortization Rate - UG Conduit	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
R State ITC Amortization Rate - UG Cond. & Dev.	0.000%	0.000%</																	

Revenue Requirements Model - Calculations																			
	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	Total
Manual input	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deferred ITC	-	-	-	-	-	-	-	-	88,709	79,838	70,967	62,096	53,225	44,354	35,483	26,613	17,742	8,871	
Net Deferred Tax Asset (Liability)	(1,168,540)	(1,097,305)	(1,026,070)	(954,836)	(883,601)	(812,366)	(741,131)	(669,896)	(601,479)	(566,346)	(528,118)	(487,035)	(443,302)	(397,124)	(348,679)	(298,144)	(247,267)	(196,383)	
Deferred Tax Base	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(276,620)	(265,679)	(136,427)	(148,447)	(159,535)	(169,825)	(179,317)	(188,122)	(196,238)	(197,569)	(197,591)	
Deferred Taxes - Federal	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(54,596)	(52,437)	(26,926)	(29,299)	(31,487)	(33,518)	(35,392)	(37,129)	(38,731)	(38,994)	(38,998)	
Deferred Taxes - State excluding credit	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(16,639)	(15,981)	(8,206)	(8,929)	(9,596)	(10,215)	(10,786)	(11,316)	(11,804)	(11,884)	(11,885)	
Change in Deferred Taxes	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(71,235)	(68,417)	(35,132)	(38,228)	(41,083)	(43,733)	(46,178)	(48,445)	(50,535)	(50,878)	(50,883)	
Accumulated Deferred Taxes	1,168,540	1,097,305	1,026,070	954,836	883,601	812,366	741,131	669,896	601,479	566,346	528,118	487,035	443,302	397,124	348,679	298,144	247,267	196,383	
check	-	-	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Change in Deferred ITC	-	-	-	-	-	-	-	-	-	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)
Rate Base and Financing																			
Investment: (Rate Base)																			
Land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Plant	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	16,155,739	18,373,453	18,373,453	18,373,453	18,373,453	18,373,453	18,373,453	18,373,453	18,373,453	18,373,453	18,373,453	18,373,453
Accumulated Depreciation	11,618,050	11,894,670	12,171,290	12,447,910	12,724,531	13,001,151	13,277,771	13,554,391	13,814,526	14,119,920	14,425,314	14,730,709	15,036,103	15,341,497	15,646,892	15,952,286	16,257,680	16,563,074	
CIAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accumulated Deferred Taxes	1,168,540	1,097,305	1,026,070	954,836	883,601	812,366	741,131	669,896	601,479	566,346	528,118	487,035	443,302	397,124	348,679	298,144	247,267	196,383	
Accumulated Deferred ITC	-	-	-	-	-	-	-	-	88,709	79,838	70,967	62,096	53,225	44,354	35,483	26,613	17,742	8,871	
Ending Net Investment	3,369,149	3,163,764	2,958,378	2,752,993	2,547,608	2,342,222	2,136,837	1,931,452	3,868,740	3,607,349	3,349,054	3,093,614	2,840,823	2,590,478	2,342,399	2,096,411	1,850,765	1,605,125	
Average Net Investment	3,471,842	3,266,456	3,061,071	2,855,686	2,650,300	2,444,915	2,239,530	2,034,145	2,900,096	3,738,045	3,478,201	3,221,334	2,967,218	2,715,650	2,466,438	2,219,405	1,973,588	1,727,945	
Average Financing:																			
Short Term Debt	41,103	38,672	36,240	33,808	31,377	28,945	26,514	24,082	34,334	44,255	41,178	38,137	35,129	32,151	29,200	26,275	23,365	20,457	
Long Term Debt (Taxable Debt)	1,374,663	1,293,342	1,212,020	1,130,698	1,049,377	968,055	886,734	805,412	1,148,282	1,480,065	1,377,181	1,275,475	1,174,859	1,075,252	976,577	878,765	781,435	684,174	
Hybrids	42,407	39,898	37,390	34,881	32,372	29,864	27,355	24,846	35,423	45,659	42,485	39,347	36,243	33,171	30,126	27,109	24,107	21,106	
Preferred Stock	31,285	29,435	27,584	25,733	23,882	22,032	20,181	18,330	26,133	33,684	31,343	29,028	26,738	24,471	22,226	19,999	17,784	15,571	
Common Equity	1,982,383	1,865,110	1,747,838	1,630,565	1,513,292	1,396,019	1,278,747	1,161,474	1,655,923	2,134,382	1,986,014	1,839,346	1,694,249	1,550,606	1,408,309	1,267,256	1,126,897	986,637	
Total Financing	3,471,842	3,266,456	3,061,071	2,855,686	2,650,300	2,444,915	2,239,530	2,034,145	2,900,096	3,738,045	3,478,201	3,221,334	2,967,218	2,715,650	2,466,438	2,219,405	1,973,588	1,727,945	
Return on Investment																			
Short Term Debt	719	677	634	592	549	507	464	421	601	774	721	667	615	563	511	460	409	358	
Long Term Debt (Taxable Debt)	69,146	65,055	60,965	56,874	52,784	48,693	44,603	40,512	57,759	74,447	69,272	64,156	59,095	54,085	49,122	44,202	39,306	34,414	
Hybrids	3,049	2,869	2,688	2,508	2,328	2,147	1,967	1,786	2,547	3,283	3,055	2,829	2,606	2,385	2,166	1,949	1,733	1,518	
Total Interest Expense	72,914	68,601	64,287	59,974	55,660	51,347	47,034	42,720	60,906	78,505	73,047	67,653	62,316	57,033	51,799	46,611	41,448	36,289	
Preferred Dividends	1,680	1,581	1,481	1,382	1,282	1,183	1,084	984	1,403	1,809	1,683	1,559	1,436	1,314	1,194	1,074	955	836	
Net Income on Common	188,326	177,185	166,045	154,904	143,763	132,622	121,481	110,340	157,313	202,766	188,671	174,738	160,954	147,308	133,789	120,389	107,055	93,731	
Income Taxes																			
Income Before Pref Dividends	190,006	178,766	167,526	156,286	145,045	133,805	122,565	111,324	158,716	204,575	190,354	176,297	162,389	148,622	134,983	121,463	108,010	94,567	
Income Before Taxes (including ITC)	255,907	240,769	225,630	210,491	195,352	180,213	165,074	149,936	213,764	275,529	256,376	237,443	218,712	200,169	181,800	163,591	145,472	127,366	
Investment Tax Credit	-	-	-	-	-	-	-	-	-	8,871	8,871	8,871	8,871	8,871	8,871	8,871	8,871	8,871	
Income Before Taxes (excluding ITC)	255,907	240,769	225,630	210,491	195,352	180,213	165,074	149,936	213,764	266,658	247,505	228,572	209,841	191,298	172,929	154,720	136,601	118,495	
Federal Income Tax	50,508	47,520	44,532	41,544	38,556	35,568	32,580	29,593	42,190	54,381	50,601	46,864	43,167	39,507	35,882	32,288	28,712	25,138	
State Income Tax	15,393	14,482	13,572	12,661	11,751	10,840	9,929	9,019	12,858	16,573	15,421	14,282	13,156	12,040	10,935	9,840	8,750	7,661	
State Investment Tax Credit	-	-	-	-	-	-	-	-	-	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	
Total State Tax	15,393	14,482	13,572	12,661	11,751	10,840	9,929	9,019	12,858	7,702	6,550	5,411	4,285	3,169	2,064	969	(121)	(1,210)	
Total Taxes	65,901	62,002	58,104	54,205	50,307	46,408	42,510	38,611	55,048	62,083	57,151	52,275	47,452	42,676	37,946	33,257	28,591	23,928	
Revenue Requirement Calculation																			
Revenue Requirement	694,801	674,058	653,328	632,609	611,904	591,211	570,531	549,865	622,482	750,231	723,946	697,984	672,324	646,944	621,823	596,945	572,209	547,508	61,516,492
Revenue Taxes	61,733	59,890	58,048	56,207	54,368	52,529	50,692	48,856	55,307	66,658	64,323	62,016	59,736	57,481	55,249	53,039	50,841	48,646	5,465,740
Income Before Depr., Int., Inc Tax	633,068	614,168	595,279	576,402	557,536	538,682	519,840	501,010	567,174	683,573	659,623	635,969	612,588	589,463	566,574	543,906	521,369	498,862	
Depreciation Expense	276,620	276,620	276,620	276,620	276,620	276,620	276,620	276,620	260,135	305,394	305,394	305,394	305,394	305,394	305,394	305,394	305,394	305,394	9,405,088
CIAC Amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O&M	27,626	28,179	28,742	29,317	29,903	30,502	31,112	31,734	32,368	33,016	33,676	34,350	35,037	35,737	36,452	37,181	37,925	38,683	1,371,561
Interest Expense	72,914	68,601	64,287	59,974	55,660	51,347	47,034	42,720	60,906	78,505	73,047	67,653	62,316	57,033	51,799	46,611	41,448	36,289	8,612,994
Income Before Income Taxes	255,907	240,769	225,630	210,491	195,352	180,213	165,074	149,936	213,764	266,658	247,505	228,572	209,841	191,298	172,929	154,720	136,601	118,495	
Income Taxes - Federal	50,508	47,520	44,532	41,544	38,556	35,568	32,580	29,593	42,190	54,381	50,601	46,864	43,167	39,507	35,882	32,288	28,712	25,138	5,966,287
Income Taxes - State	15,393	14,482	13,572	12,661	11,751	10,840	9,929	9,019	12,858	16,573	15,421	14,282	13,156	12,040	10,935	9,840	8,750	7,661	1,818,297
State ITC	-	-	-	-	-	-	-	-	-	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(8,871)	(646,230)
Total Income Taxes	65,901	62,002	58,104	54,205	50,307	46,408	42,510	38,611	55,048										

Hawaiian Electric Co., Inc.
TOTAL GWH SALES FORECAST (INCLUDING FUTURE LAYERS)
June 2017 Forecast

Year	Sch R GWh Sales	% Change	Sch G GWh Sales	% Change	Sch J GWh Sales	% Change	Sch P GWh Sales	% Change	Sch F GWh Sales	% Change	Total GWh Sales	% Change
Recd 2016	1,580.4		292.6		1,842.1		2,911.1		34.0		6,660.2	
2017	1,540.8	-2.5%	293.1	0.2%	1,858.8	0.9%	2,903.9	-0.2%	32.5	-4.4%	6,629.1	-0.5%
2018	1,499.2	-2.7%	286.9	-2.1%	1,855.4	-0.2%	2,895.3	-0.3%	31.1	-4.3%	6,567.9	-0.9%
2019	1,456.0	-2.9%	280.3	-2.3%	1,850.8	-0.2%	2,927.1	1.1%	30.9	-0.6%	6,545.1	-0.3%
2020	1,434.4	-1.5%	275.8	-1.6%	1,838.1	-0.7%	2,978.0	1.7%	30.7	-0.6%	6,557.0	0.2%
2021	1,404.0	-2.1%	272.1	-1.3%	1,823.8	-0.8%	3,036.3	2.0%	30.3	-1.3%	6,566.5	0.1%
2022	1,378.8	-1.8%	268.5	-1.3%	1,807.7	-0.9%	3,045.4	0.3%	30.2	-0.3%	6,530.6	-0.5%
2023	1,343.1	-2.6%	262.5	-2.2%	1,773.5	-1.9%	2,998.6	-1.5%	29.9	-1.0%	6,407.6	-1.9%
2024	1,323.9	-1.4%	257.5	-1.9%	1,739.2	-1.9%	3,005.2	0.2%	29.6	-1.0%	6,355.4	-0.8%
2025	1,294.2	-2.2%	252.8	-1.8%	1,716.4	-1.3%	2,957.2	-1.6%	29.3	-1.0%	6,249.9	-1.7%
2026	1,263.4	-2.4%	247.6	-2.1%	1,699.4	-1.0%	2,956.3	0.0%	29.0	-1.0%	6,195.7	-0.9%
2027	1,229.4	-2.7%	242.2	-2.2%	1,679.5	-1.2%	2,917.6	-1.3%	28.6	-1.4%	6,097.3	-1.6%
2028	1,190.2	-3.2%	236.4	-2.4%	1,660.6	-1.1%	2,879.5	-1.3%	28.5	-0.3%	5,995.2	-1.7%
2029	1,136.6	-4.5%	228.1	-3.5%	1,622.0	-2.3%	2,815.1	-2.2%	28.0	-1.8%	5,829.8	-2.8%
2030	1,107.5	-2.6%	222.3	-2.5%	1,601.1	-1.3%	2,776.7	-1.4%	27.7	-1.1%	5,735.3	-1.6%
2031	1,076.4	-2.8%	215.9	-2.9%	1,579.7	-1.3%	2,730.2	-1.7%	27.4	-1.1%	5,629.6	-1.8%
2032	1,074.6	-0.2%	212.7	-1.5%	1,573.5	-0.4%	2,706.6	-0.9%	27.3	-0.4%	5,594.7	-0.6%
2033	1,076.0	0.1%	208.4	-2.0%	1,555.3	-1.2%	2,687.8	-0.7%	27.0	-1.1%	5,554.5	-0.7%
2034	1,085.5	0.9%	206.1	-1.1%	1,553.3	-0.1%	2,675.2	-0.5%	26.8	-0.7%	5,546.9	-0.1%
2035	1,096.3	1.0%	205.1	-0.5%	1,551.5	-0.1%	2,681.4	0.2%	26.5	-1.1%	5,560.8	0.3%
2036	1,115.1	1.7%	205.5	0.2%	1,555.6	0.3%	2,676.7	-0.2%	26.5	0.0%	5,579.4	0.3%
2037	1,133.6	1.7%	205.0	-0.2%	1,550.3	-0.3%	2,661.9	-0.6%	26.2	-1.1%	5,577.0	0.0%
2038	1,155.4	1.9%	205.4	0.2%	1,552.0	0.1%	2,651.4	-0.4%	26.1	-0.4%	5,590.3	0.2%
2039	1,183.3	2.4%	205.5	0.0%	1,553.4	0.1%	2,647.8	-0.1%	25.9	-0.8%	5,615.9	0.5%
2040	1,217.9	2.9%	206.6	0.5%	1,568.8	1.0%	2,654.9	0.3%	25.9	0.0%	5,674.1	1.0%
2041	1,244.0	2.1%	207.6	0.5%	1,574.7	0.4%	2,628.1	-1.0%	25.6	-1.2%	5,680.0	0.1%
2042	1,278.9	2.8%	207.8	0.1%	1,577.8	0.2%	2,633.4	0.2%	25.4	-0.8%	5,723.3	0.8%
2043	1,317.6	3.0%	208.9	0.5%	1,590.1	0.8%	2,623.9	-0.4%	25.2	-0.8%	5,765.7	0.7%
2044	1,361.6	3.3%	210.2	0.6%	1,605.6	1.0%	2,627.3	0.1%	25.2	0.0%	5,829.9	1.1%
2045	1,412.7	3.8%	211.3	0.5%	1,624.8	1.2%	2,630.9	0.1%	24.9	-1.2%	5,904.6	1.3%
2046	1,466.2	3.8%	215.4	1.9%	1,671.8	2.9%	2,617.6	-0.5%	24.8	-0.4%	5,995.8	1.5%
2047	1,520.7	3.7%	219.3	1.8%	1,715.8	2.6%	2,602.4	-0.6%	24.6	-0.8%	6,082.8	1.5%

Hawaiian Electric Company

AES – CEIP 1 138kV Transmission Line Relocation

Electric and Magnetic Field Evaluation

Prepared For:

Hawaiian Electric Company

Honolulu, Hawaii 96840

Prepared By:

Sargent and Lundy, LLC

February 23, 2018

Executive Summary

Hawaiian Electric Company, Inc., (“Hawaiian Electric”) proposes to relocate a portion of an existing overhead power line, the AES-CEIP 1 138kV transmission line. This project involves the relocation of the existing 138kV overhead power line by the removal of 2 steel structures and 17 wood structure P.10-P.36 and the installation of 12 steel structures P.10-P.21. This relocation is at the request of Kapolei Properties (“KPD”). The existing line is in conflict with KPD’s development plans.

Based upon this evaluation, the following conclusions were reached:

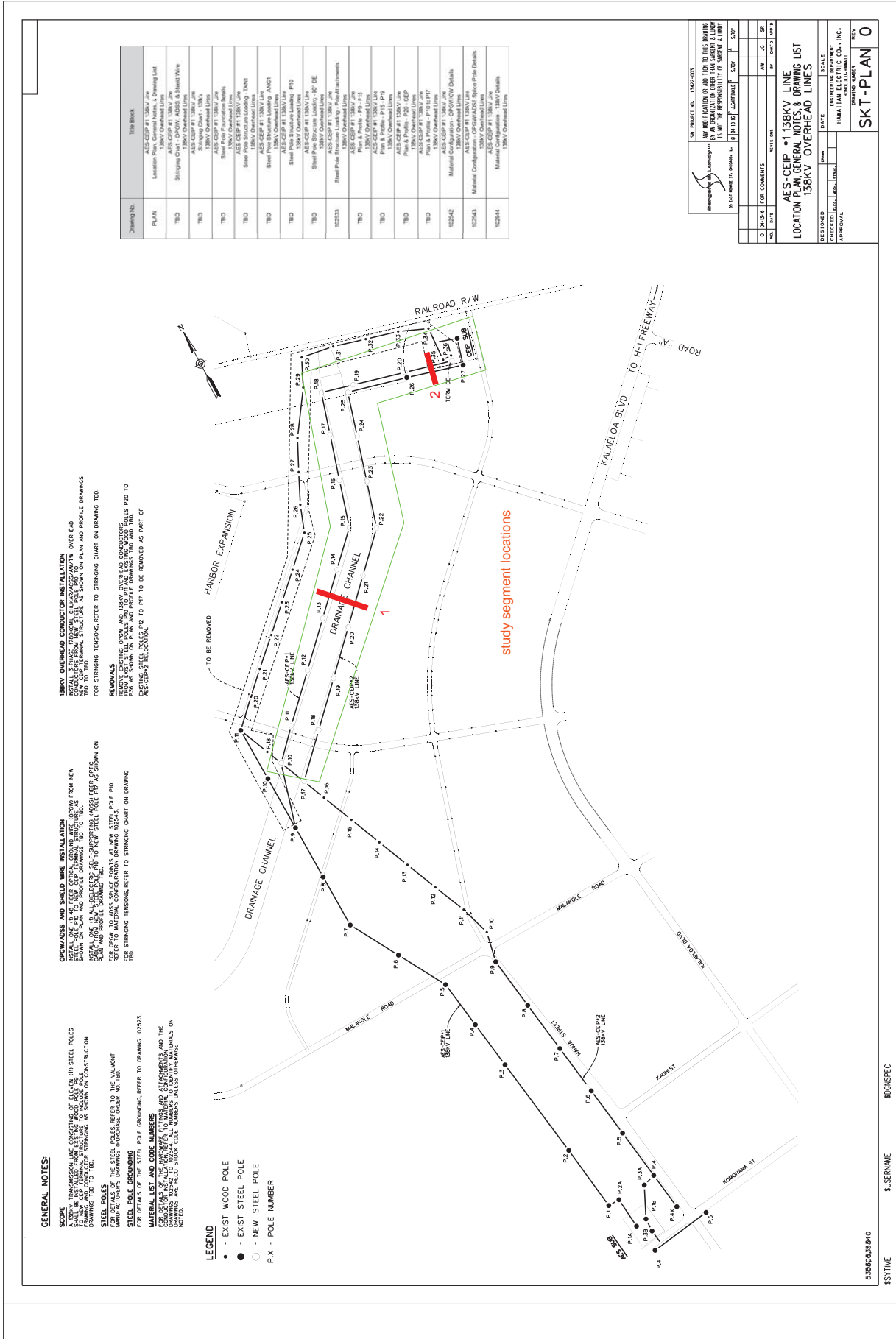
Calculated electric and magnetic fields for the proposed relocations for the project line:

S&L study takes both Lines #1 and #2 into consideration at two distinct cross sections and includes the 46 kV sub-transmission line. The EMF model is based on a 50 ft right-of-way for each of the two lines. The electrical field at the edge of the right-of-way is approximately 0.3 kV/m. The magnetic field strength at the edge of the right-of-way is between 75 mG and 85 mG. Calculated electric field levels for the proposed overhead relocation for segment 1 ranged from about 0.018 kV/m to 0.532 kV/m. Calculated electric field levels for the proposed overhead relocation for segment 2 ranged from about 0.019 kV/m to 0.709 kV/m. Calculated electric fields from the proposed overhead relocation are lower primarily due to the increased ground clearance of the proposed relocation configuration. Calculated electric field levels for the underground alternative relocation are 0.000 kV/m, due to the electric field shielding of the earth.

Calculated magnetic field levels for the proposed overhead relocation for segment 1 ranged from about 18.82 mG to 128.02 mG. Calculated magnetic field levels for the proposed overhead relocation for segment 2 ranged from about 8.20 mG to 161.67 mG. Calculated magnetic fields from the proposed overhead relocation are lower primarily due to the increased ground clearance of the proposed relocation configuration. Calculated magnetic field levels for the underground alternative relocation ranged from about 33.77 mG to 1061.99 mG. Calculated magnetic fields from the underground alternative are further reduced due to the increased magnetic field cancellation from unlike phasing of the two phase subconductors and the closer proximity of the phase conductors within the underground duct. The results of the EMF calculations for the proposed overhead line are shown in the attached report.

There are no Federal or State of Hawaii health standards for 60 Hertz electric or magnetic fields

Over the past two decades, there has been research investigating exposure to EMF. Although there are no Federal health standards in the United States or in the state of Hawaii specifically for 60 Hertz electric and magnetic fields, there are at least six states that have adopted engineering-based guidelines or standards for higher voltage transmission line electric fields; two of these states also have standards for magnetic fields. The purpose of most of these standards is to make the field levels from new power lines similar to the field levels from existing lines or to avoid nuisance effects due to spark discharge from large vehicles in the electric fields of 345-765 kV transmission lines. The project line is a much lower voltage line (138kV) than the power line voltages described in these guidelines, and the measured and calculated electric and magnetic field levels associated with the project line are below these other state standards.



GENERAL NOTES:

SCOPE
A 138KV TRANSMISSION LINE, CONSISTING OF ELEVATED (TO STEEL POLES) AND GROUND MOUNTED (WOOD POLES) OVERHEAD LINES, INCLUDING ALL NECESSARY STRUCTURES, INCLUDING BUT NOT LIMITED TO: TOWER, PILE, AND FOUNDATION, AS SHOWN ON DRAWING. REFER TO DRAWING FOR DETAILS.

STEEL POLES
ALL STEEL POLES SHALL BE FABRICATED FROM A36 STEEL, UNLESS OTHERWISE SPECIFIED. REFER TO DRAWING FOR DETAILS.

STEEL POLE GROUNDING
FOR DETAILS OF THE STEEL POLE GROUNDING, REFER TO DRAWING 102522.

MATERIAL LIST AND CODE NUMBERS
FOR MATERIALS, REFER TO THE MATERIAL LIST AND CODE NUMBERS PROVIDED IN THE DRAWING. REFER TO THE MATERIAL LIST AND CODE NUMBERS PROVIDED IN THE DRAWING FOR DETAILS.

OVERHEADS AND SHIELD WIRE INSTALLATION
INSTALL OVERHEADS AND SHIELD WIRE AS SHOWN ON PLAN AND PROFILE DRAWINGS. REFER TO DRAWING FOR DETAILS.

REMOVALS
REMOVE EXISTING OVERHEADS AND SHIELD WIRE AS SHOWN ON DRAWING. REFER TO DRAWING FOR DETAILS.

FOR STRINGING TENSORS, REFER TO STRINGING CHART ON DRAWING.

138KV OVERHEAD CONDUCTOR INSTALLATION
INSTALL 138KV OVERHEAD CONDUCTORS AS SHOWN ON PLAN AND PROFILE DRAWINGS. REFER TO DRAWING FOR DETAILS.

REMOVALS
REMOVE EXISTING 138KV OVERHEAD CONDUCTORS AS SHOWN ON DRAWING. REFER TO DRAWING FOR DETAILS.

FOR STRINGING TENSORS, REFER TO STRINGING CHART ON DRAWING.

LEGEND

- - EXIST WOOD POLE
- - NEW STEEL POLE
- P.X - POLE NUMBER

Drawing No.	Title Block
PLAN	AES-CEIP #1 138KV Line Location Plan and Pole Sizing List
T1D	138KV Overhead Lines Stringing Chart - CHAW, ADAS & Shield Wire
T1D	138KV Overhead Lines Stringing Chart - 138KV
T1D	138KV Overhead Lines Steel Pole Foundation Details
T1D	138KV Overhead Lines Steel Pole Structure Loading - TANK
T1D	138KV Overhead Lines Steel Pole Structure Loading - ANGI
T1D	138KV Overhead Lines Steel Pole Structure Loading - P10
T1D	138KV Overhead Lines Steel Pole Structure Loading - P10 DE
102523	Steel Pole Structure Loading - Pole Attachments
T1D	AES-CEIP #1 138KV Line Pole & Poles (P.1 - P.1)
T1D	AES-CEIP #1 138KV Line Pole & Poles (P.1 - P.9)
T1D	AES-CEIP #1 138KV Line Pole & Poles (P.10 - P.17)
T1D	AES-CEIP #1 138KV Line Pole & Poles (P.18 - P.24)
T1D	AES-CEIP #1 138KV Line Pole & Poles (P.25 - P.35)
102542	Material Configuration - Steel Pole Details
102543	Material Configuration - Steel Pole Details
102544	Material Configuration - Steel Pole Details

DESIGNED		CHECKED		APPROVED	
DATE	BY	DATE	BY	DATE	BY
PROJECT NO. 138KV-001		SCALE		SHEET NO. 0	
TITLE		DATE		SCALE	
AES-CEIP #1 138KV LINE		1/2024		1/100	
LOCATION PLAN, GENERAL NOTES, & DRAWING LIST		138KV OVERHEAD LINES		SKT-PLAN	
ENGINEERING DEPARTMENT		SCALE		SHEET NO.	
138KV OVERHEAD LINES		1/100		0	

Graphical comparisons of the electric and magnetic field results for the proposed overhead relocation calculation and proposed underground relocation calculation results.

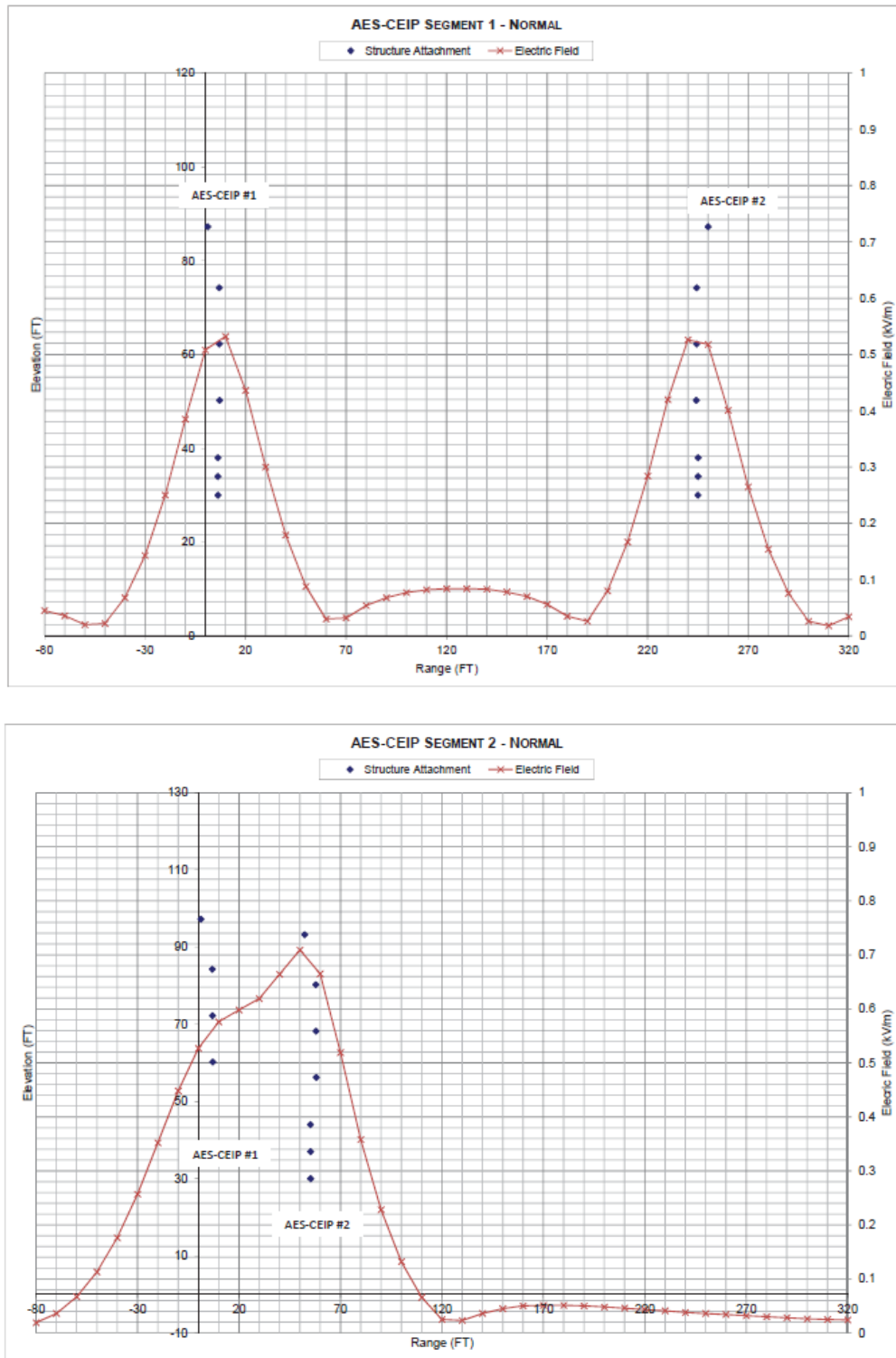


Figure 1. Normal Overhead Electric Fields

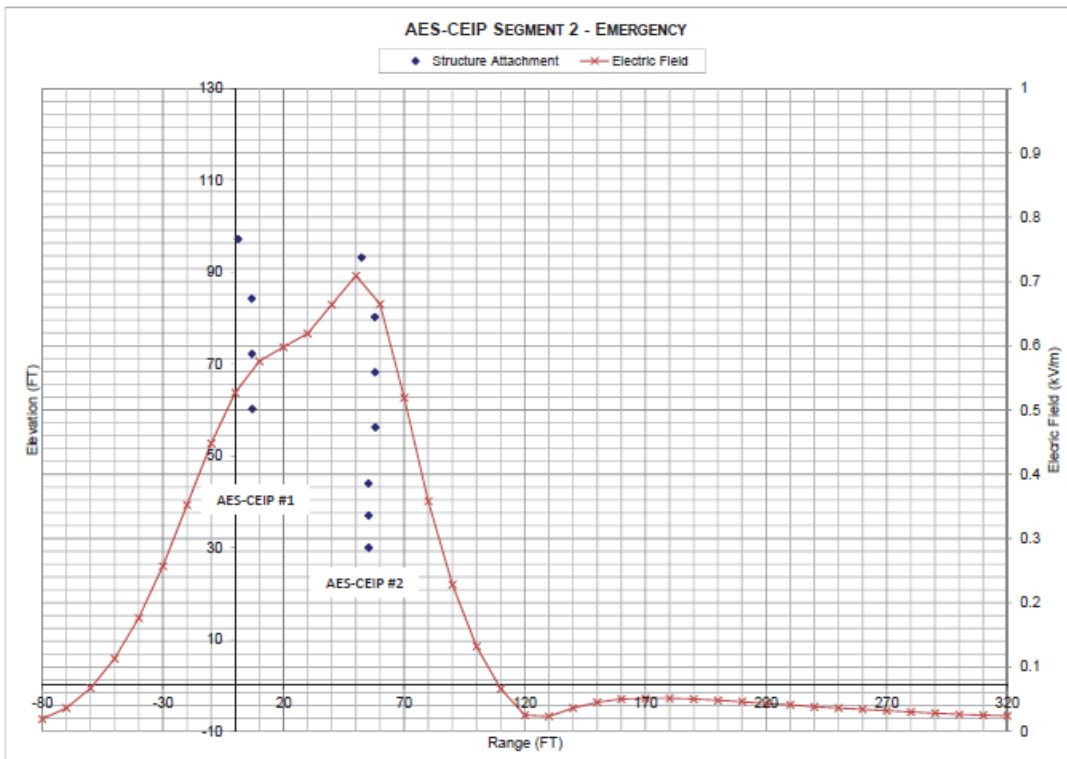
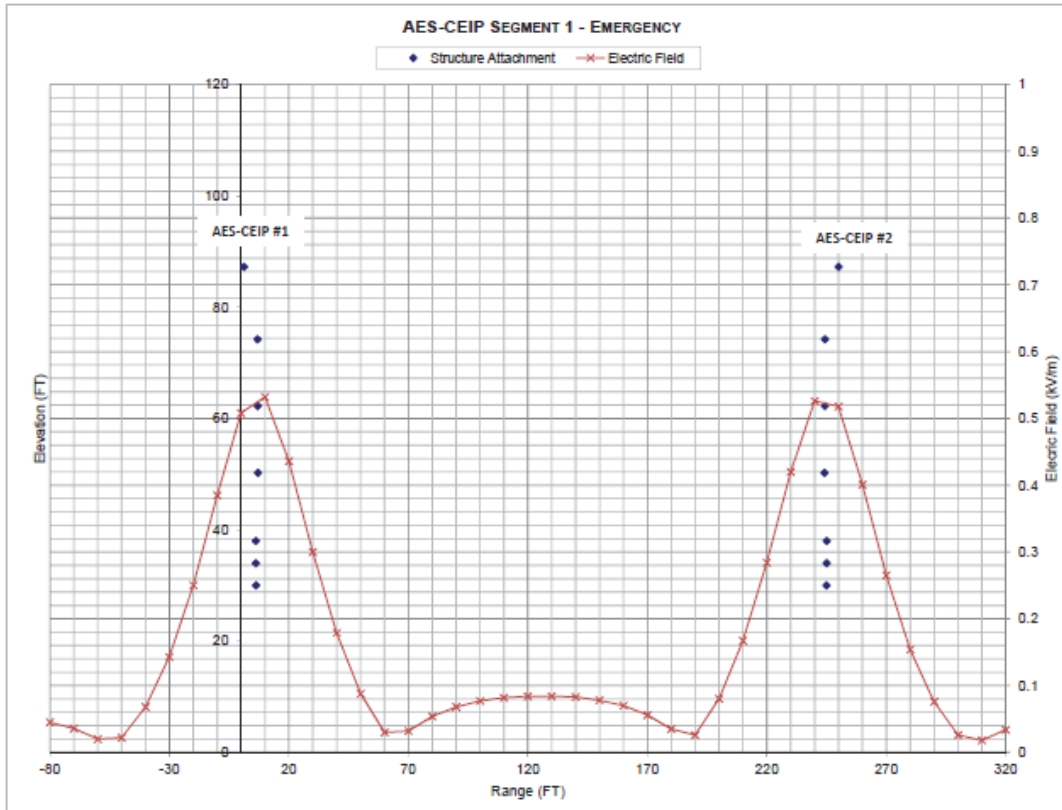


Figure 2. Emergency Overhead Electric Fields

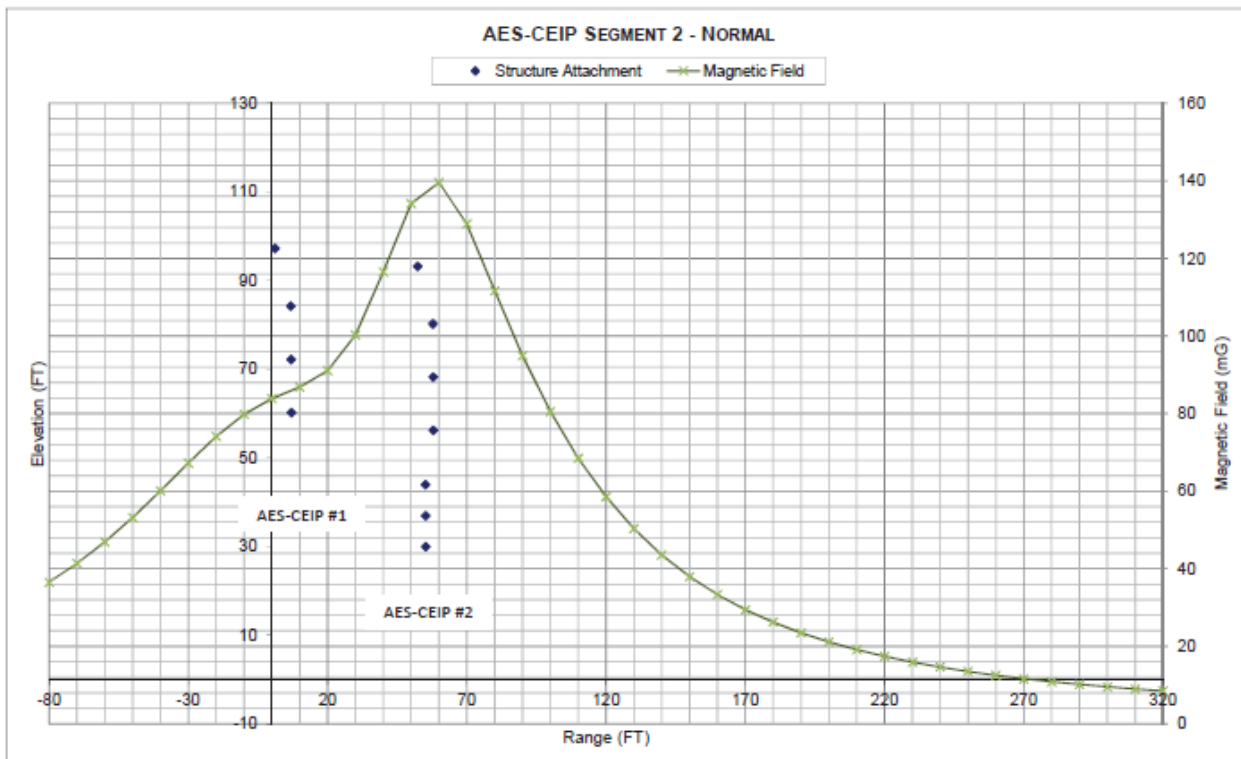
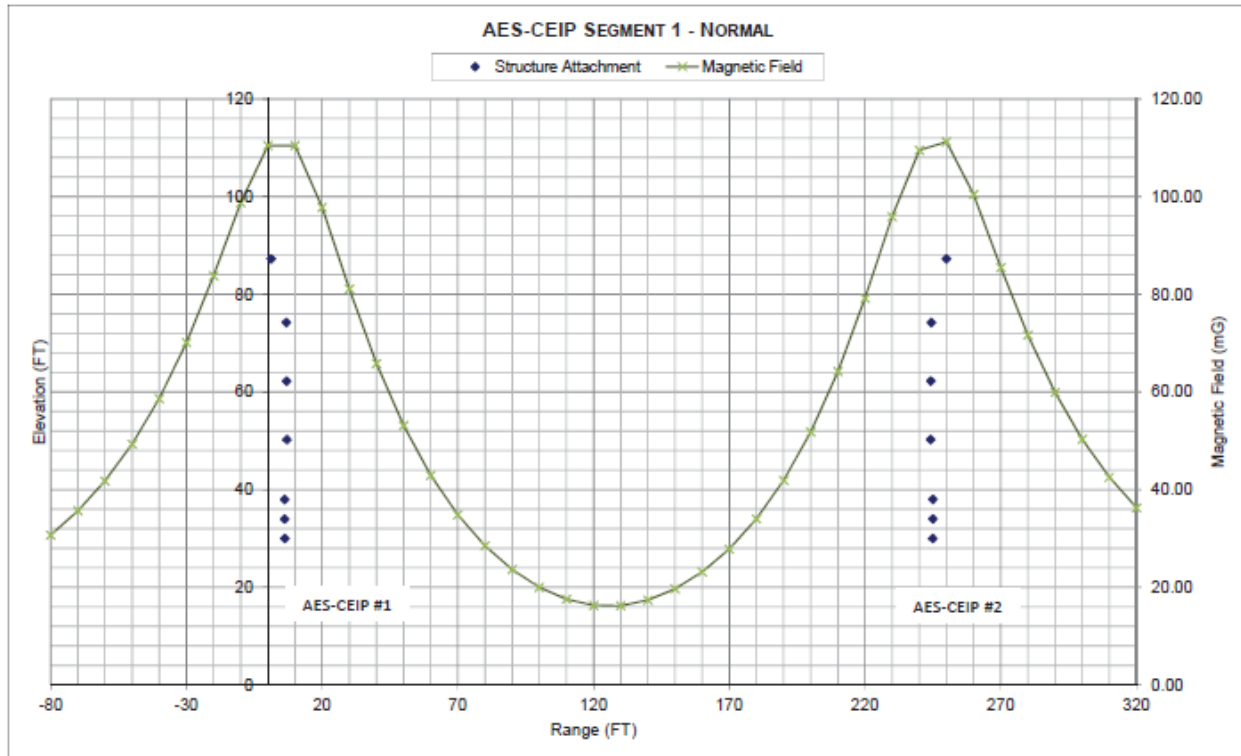


Figure 3. Normal Overhead Magnetic Fields

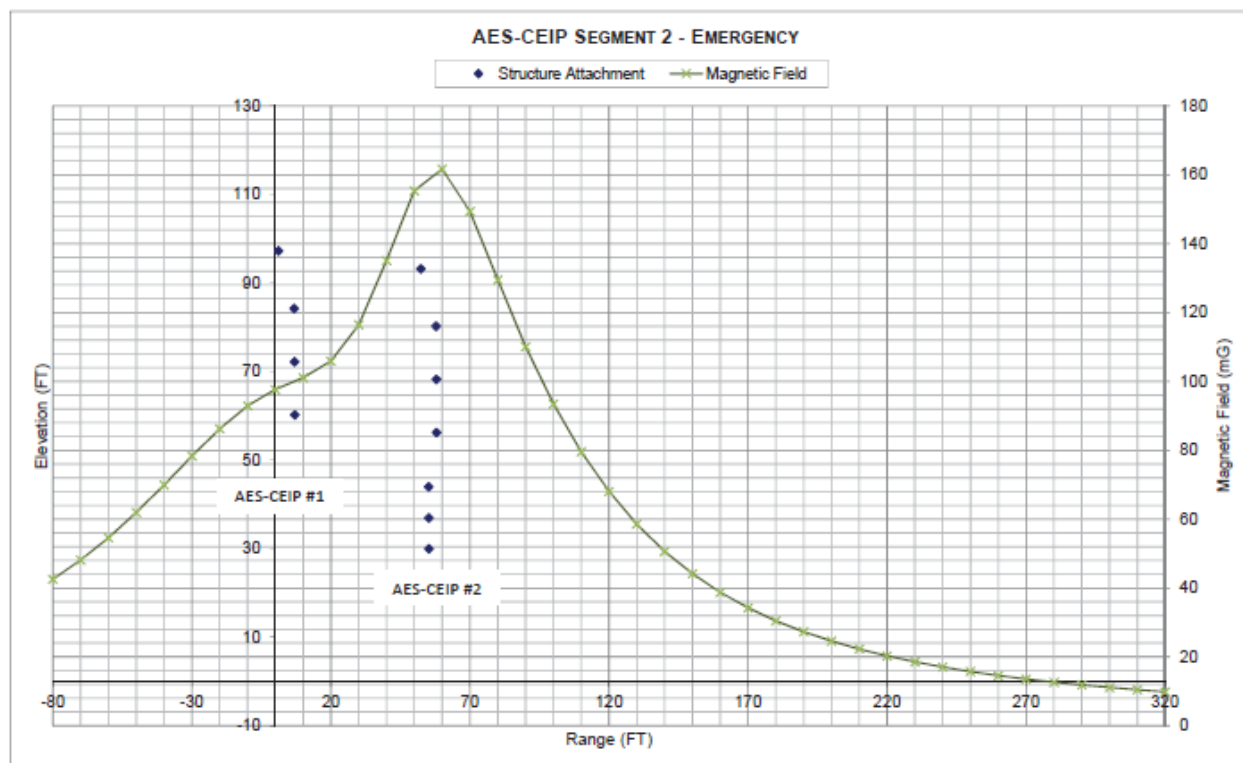
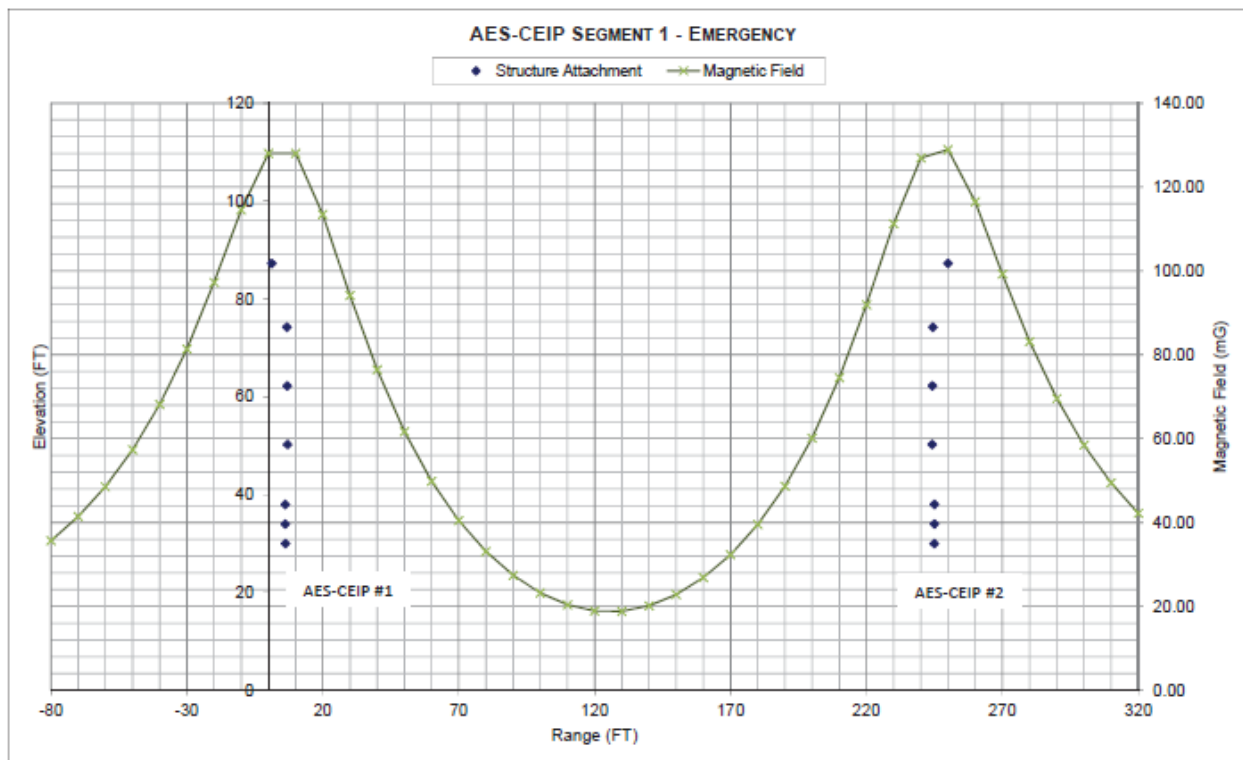


Figure 4. Emergency Overhead Magnetic Fields

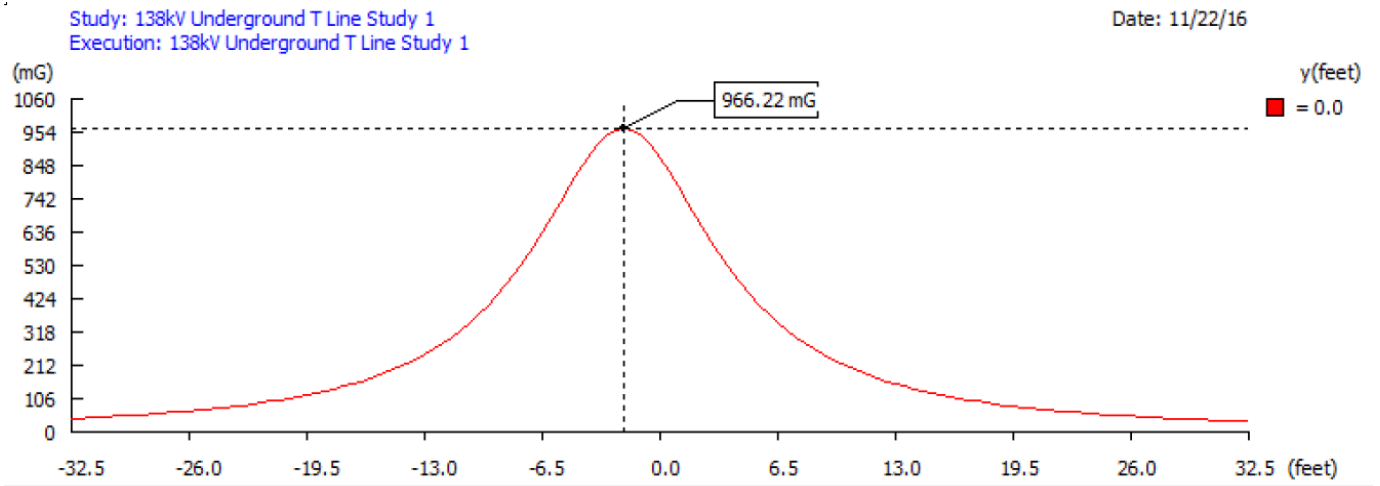


Figure 5. Normal Underground Magnetic Fields

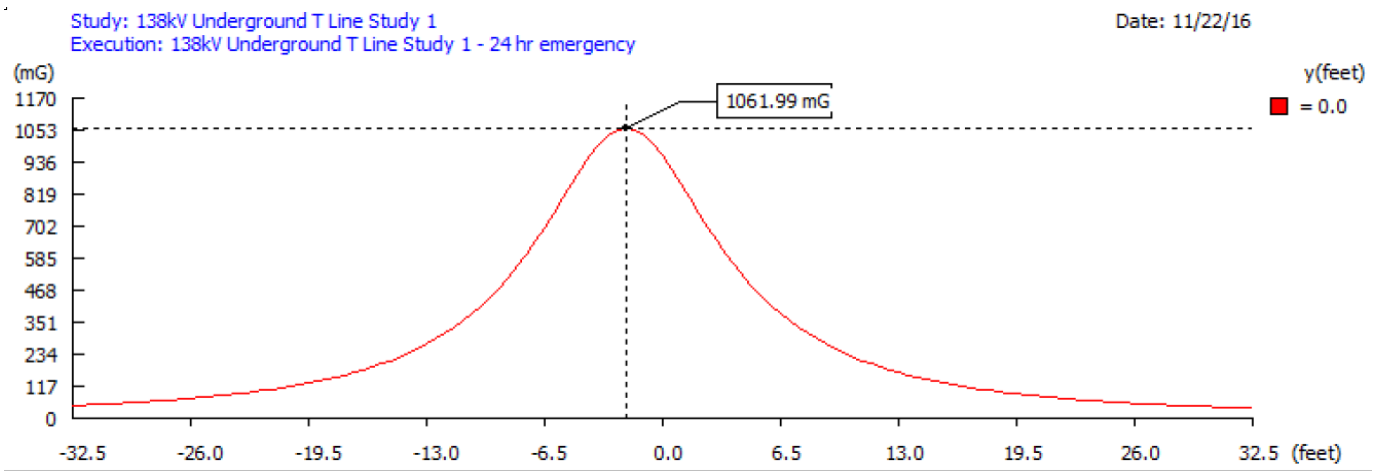


Figure 6. Emergency Underground Magnetic Fields

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 Commit Funds in Excess of)
\$2,500,000 (excluding customer contributions))
for the P0004085 – AES-CEIP 1 138 kV)
Overhead Transmission Line Relocation Project.)
_____)

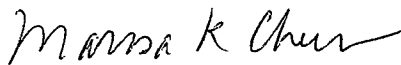
CERTIFICATE OF SERVICE

I hereby certify that I have this date served two copies of the foregoing Application, Verification and Exhibits I-VII, together with this Certificate of Service, by making personal service and/or mailing a copy by United States mail, postage paid, to the following and at the following address:

Dean Nishina (two copies via hand delivery)
Executive Director
Division of Consumer Advocacy
Department of Commerce and Consumer Affairs
335 Merchant Street, Room 326
Honolulu, Hawai'i 96813

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