

HECO T-7
DOCKET NO. 03-0XXX

TESTIMONY OF
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HAWAIIAN ELECTRIC COMPANY, INC.

Subject: Routing

1 A. Two new 46kV circuits are required between Makaloa Substation and McCully
2 Substation. Makaloa Substation is located at the corner of Amana Street and
3 Makaloa Street. McCully Substation is located at the intersection of Lime Street
4 and Pumehana Street. For planning purposes, it was assumed that the two new
5 46kV circuits would be installed in a single new underground ductline. The
6 planned route of the main ductline begins at Makaloa Substation. The ductline
7 would exit Makaloa Substation onto Makaloa Street and head in the Diamond
8 Head direction, past the Daiei store on the corner of Makaloa and Kaheka Streets,
9 until Kalakaua Avenue. At Kalakaua Avenue, the ductline heads in the makai
10 direction along Kalakaua Avenue for a short distance until the intersection with
11 Fern Street. The ductline then proceeds in the Diamond Head direction along
12 Fern Street until the intersection of Fern Street and Hauoli Street. The ductline
13 then heads in the makai direction along Hauoli Street, until turning in the
14 Diamond Head direction onto Lime Street. The main ductline would then
15 continue a short distance along Lime Street and end at a new manhole fronting
16 McCully Substation. The total length of the proposed main ductline is
17 approximately 3,450 feet.

18 Q. How many ducts are required for the proposed new ductline?

19 A. The main ductline would consist of eight new ducts. Each of the two 46kV
20 circuits would occupy three ducts (one duct for each single-phase cable; three
21 cables per each 46kV circuit). The two remaining ducts would serve as spares.

22 Q. Do the two new 46kV circuits continue on from the new manhole on Lime Street?

23 A. Yes. From the new manhole on Lime Street, the two circuits branch off into two
24 separate ductlines. The first circuit extends approximately 50 feet from the new
25 manhole on Lime Street and interconnects with an existing underground 46kV

1 circuit in a manhole within McCully Substation. The second circuit extends
2 approximately 200 feet from the new manhole on Lime Street to the location of an
3 existing pole on Pumehana Street. A new underground riser pole will replace this
4 existing pole, allowing the second circuit to interconnect with an existing
5 overhead 46kV circuit on Pumehana Street.

6 Q. Why is an all-underground alignment proposed for these two new 46kV circuits
7 between Makaloa and McCully Substations?

8 A. A number of factors were considered in proposing an all-underground alignment
9 for these two 46kV circuits. For the most part, it is not practical or prudent to
10 construct these two proposed 46kV circuits overhead between Makaloa Substation
11 and McCully Substation because of the following factors: (1) all three of the
12 existing 46kV circuits between these two substations are located underground; (2)
13 an existing underground ductline may be used for the new 46kV circuits; (3) the
14 potential for costly project delay associated with an overhead proposal; (4)
15 engineering and construction constraints; and (5) applicable City ordinances.

16 Q. Please summarize how the existing three underground 46kV lines between these
17 two substations was a factor in proposing an underground alignment for the two
18 new 46kV circuits.

19 A. There are three existing 46kV circuits between Makaloa and McCully Substations.
20 All three of these circuits are located underground and share a single common
21 ductline. This existing ductline follows the same route proposed for the two new
22 46kV circuits. It appears that the existing three 46kV circuits between these
23 substations were originally placed underground in a single common ductline
24 because constructing three 46kV circuits overhead would have been difficult, if
25 not impractical, due to existing tall buildings abutting the right-of-way and narrow

1 roadway along significant portions of the route. As explained by Ms. Ishikawa in
2 her testimony in T-4, the two new 46kV circuits are higher capacity cables and are
3 essentially an upgrade to the existing three 46kV circuits described above. Once
4 installed, the two new 46kV circuits will replace the existing three 46kV circuits,
5 which will be cut and removed from the existing ductline. In the course of
6 upgrading existing underground circuits, HECO has generally not proposed
7 overhead construction for the replacement circuits, which in effect would convert
8 existing underground circuits to overhead. A proposal to convert existing
9 underground circuits to overhead would likely give rise to public opposition,
10 increasing the risk of costly project delay.

11 Q. Is there a possibility that the existing common ductline for the three existing 46kV
12 circuits that is being replaced by this project can be reused for the two new 46kV
13 circuits?

14 A. Yes. That possibility was another factor in proposing an all-underground
15 alignment for the two new 46kV circuits. The existing common ductline between
16 Makaloa and McCully Substations is composed of a total of six ducts. This
17 common ductline contains the three existing lower capacity 46kV circuits
18 described above, and three existing 12kV circuits. Each of the three 46kV circuits
19 occupies a single duct and each of the three 12kV circuits occupies a single duct.
20 Removal of the existing three 46kV cables would conceivably free-up three of the
21 six ducts within the existing common ductline. Moreover, modifications to the
22 12kV system in the area would allow the existing 12kV circuits in the ductline to
23 be removed, freeing-up the remaining three ducts. The two new 46kV
24 replacement circuits could then be installed in these six existing ducts. Each of
25 the two 46kV circuits would occupy three ducts (one duct for each single-phase

1 cable; three cables per each 46kV circuit). The ability to reuse the six existing
2 ducts to install the two new 46kV circuits could potentially reduce the cost of
3 placing the two new 46kV circuits underground. Most significant, it would
4 substantially reduce the extent of construction impacts and trenching in roadways
5 along the proposed alignment.

6 Q. Are there practical limitations to utilizing the existing common ductline for the
7 two proposed new 46kV lines?

8 A. Possibly. Whether or not the existing 46kV and 12kV circuits could be cleanly
9 removed from the existing ducts between the Makaloa and McCully Substations,
10 thereby leaving the ducts clear to install the proposed new 46kV circuits, can only
11 be determined by actual removal of the existing circuits in the field. There have
12 been instances in the past where existing underground circuits could not be
13 removed or the ducts reused due to damage to the ducts or surrounding concrete
14 jacket. However, even if a section of the ductline (between two manholes, for
15 instance) was found damaged, overall trenching for the two new circuits could be
16 substantially reduced with ductline restoration work confined to the general area
17 of the ductline damage.

18 Q. Please summarize the remaining factors considered in proposing an all-
19 underground alignment for the two new 46kV circuits.

20 A. The factors previously described and those that follow are explained in greater
21 detail in the memo attached as HECO-701:

- 22 • First among the remaining factors is that there are currently no other overhead
23 electrical lines on Makaloa Street from Makaloa Substation to Kalakaua
24 Avenue, except for a section of approximately 250 feet of overhead 12kV
25 lines on Makaloa Street. These overhead 12kV lines sit atop 50-foot wood

1 poles between Kalauokalani Way and Kalakaua Avenue. If an overhead
2 installation were proposed, the two new 46kV circuits would likely be
3 installed on new steel poles ranging in height from 60 to 80 feet. Public
4 opposition to the visual impacts of such an overhead line is anticipated given
5 the history of this project, which could result in significant project delays and
6 increased costs.

- 7 • Second, overhead connections into both Makaloa and McCully Substations are
8 not technically feasible due to space constraints and existing infrastructure
9 limitations.
- 10 • Third, an overhead alignment on Kalakaua Avenue may be subject to a City
11 Ordinance (Section 14-22.1, ROH) that requires public utility companies to
12 place their utility lines and related facilities underground whenever the
13 following streets are improved under certain circumstances: King Street,
14 Beretania Street, Kapiolani Boulevard, Kalakaua Avenue, Ward Avenue, and
15 Keeaumoku Street. For planning purposes, it is recognized that the City may
16 attempt to enforce this ordinance in the future, although it is uncertain when
17 the City may request that overhead lines on Kalakaua Avenue be placed
18 underground, and questions remain whether the City has the requisite
19 authority to require such undergrounding. However, by placing the circuits on
20 Kalakaua Avenue underground during initial construction, HECO would be
21 able to avoid: (1) future congestion and competition for underground
22 construction space which, based on past experience, drive up costs; (2)
23 additional future construction-related impacts from undergrounding the same
24 project within the same alignment; and (3) removal of critical circuits from
25 service for lengths of time during future underground construction of the same

1 circuits.

2 Q. What is the difference in engineering and construction costs to install the two new
3 46kV circuits overhead versus underground as proposed between Makaloa and
4 McCully Substations?

5 A. With the exception of certain limited sections of the proposed route alignment that
6 must be placed underground due to engineering reasons, the approximate
7 engineering and construction cost to otherwise install the two new 46kV circuits
8 overhead between Makaloa and McCully Substations is estimated to be \$1.9
9 million. The approximate engineering and construction cost to install the same
10 two circuits all-underground as proposed is estimated to be \$3.4 million.
11 However, notwithstanding the higher engineering and construction costs, it is not
12 practical or prudent to construct these two proposed 46kV circuits overhead given
13 the factors discussed above. Among the considerations, public opposition would
14 be increased by an overhead proposal given the history of this project, which
15 could seriously inhibit meeting the electrical system needs in a timely manner and
16 increase costs significantly.

17 Q. Is there an alternative route for these two 46kV circuits from Makaloa Substation
18 to McCully Substation?

19 A. There is another possible route using Kapiolani Boulevard instead of Fern Street,
20 although this route has a number of disadvantages. For the Kapiolani Boulevard
21 route, the main ductline would exit Makaloa Substation onto Makaloa Street, then
22 head in the Diamond Head direction until Kaheka Street. Along Kaheka Street,
23 the ductline would head in the makai direction until Kapiolani Boulevard. The
24 ductline would then head in the Diamond Head direction on Kapiolani Boulevard
25 until Hauoli Street, where the ductline would head mauka until Lime Street. The

1 main ductline would then proceed Diamond Head on Lime Street and, like in the
2 proposed alignment, end at a new manhole fronting McCully Substation. The
3 total length of this alternate ductline alignment is approximately 3,500 feet.

4 Q. What are the disadvantages of the route alignment utilizing Kapiolani Boulevard?

5 A. When compared to the proposed route alignment, the route utilizing Kapiolani
6 Boulevard has the following disadvantages:

- 7 • Unlike the proposed route alignment, Kapiolani Boulevard does not have an
8 existing ductline that may be used for the new 46kV circuits;
- 9 • Kapiolani Boulevard is subject to significantly more traffic than Makaloa,
10 Fern and Lime Streets, thus requiring more traffic control coordination and
11 costs;
- 12 • Kapiolani Boulevard is used as a utility corridor by other utilities and has a
13 higher probability of less available space under the roadway for new ducts
14 (this was evident during the recent construction of HECO's all-underground
15 Kewalo-Kamoku 138kV Transmission Line); and
- 16 • The Kapiolani Boulevard route is also slightly longer than the proposed route
17 alignment.

18 Q. Is this alternative route still under consideration?

19 A. Yes. Given the concerns voiced regarding the Fern Street route, as indicated in
20 Mr. Alm's testimony, HECO T-12, we will continue to examine the Kapiolani
21 Boulevard route. The availability of the existing ductline under Fern Street,
22 however, is a significant consideration in favor of the designated Fern Street route.

23 Other 46kV Connections

24 Q. What other 46kV connections are included in Phase 1?

25 A. As is addressed in HECO-701, two new 46kV circuits (one is approximately 30

1 feet and the other is approximately 300 feet) are required to connect the new
2 138kV to 46kV transformer to be installed in the Kamoku Substation to the
3 existing Pukele 4 overhead 46kV circuit on Date Street.

4 The existing Archer 41 overhead 46kV circuit on Pumehana Street, which
5 ends near the intersection of Date Street and Pumehana Street, needs to be re-
6 connected to the existing Pukele 2 overhead 46kV circuit on Date Street,
7 approximately 130 feet away.

8 The existing Pukele 4 overhead 46kV circuit on Mooheau Avenue, which is
9 perpendicular to Winam Avenue, needs to be connected to the existing Pukele 8
10 overhead 46kV circuit on Winam Avenue, which ends approximately one block
11 away from Mooheau Avenue. The total length of the proposed ductline is
12 approximately 420 feet. 300 feet of ductline is required to extend the existing
13 Pukele 8 circuit along Winam Avenue to the intersection with Mooheau Avenue.
14 An additional 120 feet is required to extend the ductline to the first available riser
15 pole on Mooheau Avenue.

16 For the Kamoku substation to Date Street segment, it would be impractical
17 to bring the 46kV circuits out of the Kamoku Substation in an overhead
18 alignment, as the Kamoku Substation is an enclosed substation. HECO proposes
19 to install the Pumehana Street to Date Street and Winam Avenue to Mooheau
20 Avenue segments underground as well. Given that the other 46kV lines installed
21 as part of the project are being placed underground, the relatively small
22 incremental engineering and construction cost of placing these two segments
23 underground (about \$408,000) in comparison to the total cost of the project, and
24 the adverse impact if the schedule for Phase 1 is delayed, HECO proposes to
25 install both of these short segments underground. The cost savings from

1 constructing these two line segments overhead could easily disappear if the
2 approvals and permits for the project were delayed due to public opposition to the
3 overhead alignment. The combined Koolau and Pukele service areas comprise
4 30% of Oahu's electrical demand, and an all-underground proposal should reduce
5 project opposition and provide a better opportunity to improve system reliability
6 in a timely manner.

7
8 PHASE 2 – KING STREET DUCTLINE

9 Q. Please describe the location and route of the three new 46kV underground circuits
10 proposed for Phase 2 of the project from the existing Archer Substation to the
11 McCully Street area.

12 A. Three new 46kV underground circuits are required to connect Archer Substation
13 to existing 46kV overhead circuits in the McCully area originating from the
14 Pukele Substation. The three new 46kV circuits are assumed for planning
15 purposes to be installed in one main ductline, which begins at Archer Substation
16 located on HECO's facility on Ward Avenue. Archer Substation is designed for
17 incoming and outgoing underground circuits. The main ductline would exit
18 Archer Substation onto Cooke Street and then head in the mauka direction onto
19 King Street. The main ductline then heads in the Diamond Head direction on
20 King Street until the roadway area fronting the McCully Times Supermarket. The
21 total length of the proposed main ductline is approximately 8,325 feet.

22 From the roadway fronting the McCully Times Supermarket, the ductline
23 for the first 46 kV circuit continues in the Diamond Head direction on King Street
24 until McCully Street. At McCully Street, the ductline heads in the mauka
25 direction until it crosses Young Street, where the first 46kV circuit would be

1 connected to the existing Pukele 7 overhead 46kV circuit. The length of the
2 additional ductline for this circuit is approximately 1,450 feet.

3 Fronting the McCully Times Supermarket, a ductline from the roadway for
4 the second 46kV circuit branches off from the main ductline and terminates in the
5 sidewalk area near the base of an existing pole on King Street fronting the parking
6 lot of the McCully Times Supermarket. The second 46kV circuit would be
7 connected to the existing Pukele 5 overhead 46kV circuit on this pole. The length
8 of the additional ductline for this circuit is approximately 40 feet.

9 A ductline for the third 46kV circuit branches off from the main ductline at
10 the same location as the second 46kV circuit ductline and terminates in the
11 sidewalk area near the base of an existing pole on King Street fronting American
12 Savings Bank. The third 46kV circuit would be connected to the existing Pukele
13 5 overhead 46kV circuit on this pole. The length of the additional ductline for this
14 circuit is approximately 50 feet.

15 Q. Why is an all-underground alignment proposed for these three new 46kV circuits
16 from Archer Substation?

17 A. The following factors were considered in proposing an all-underground alignment
18 for these three new 46kV circuits:

- 19 • State and City laws (the State's Hawaii Community Development Authority
20 Kakaako Community Development District, and the City's Thomas
21 Square/Honolulu Academy of Arts Special Design District) require the
22 placement of new lines underground along Cooke Street and King Street
23 between Archer Substation and Pensacola Street, approximately one-third of
24 the entire length of these circuits.
- 25 • There are currently no overhead electrical lines running along King Street

1 from Cooke Street to McCully Street. The possibility of obtaining approvals
2 in a timely manner to install three new overhead 46kV lines on King Street
3 appears to be remote, given that lines on King Street were previously placed
4 underground. If an overhead installation were considered on King Street
5 (beginning from Pensacola Street to McCully Street), two of the proposed new
6 46kV circuits would likely be installed on new 60 to 70 foot steel poles
7 located on one side of King Street. The third new 46kV line would likely be
8 installed on smaller wood poles on the other side of King Street. Based on
9 past experience of this project, public opposition to the visual impacts of such
10 an overhead route alignment is anticipated, which could result in significant
11 delays to project approval and permitting. Such delays would not only
12 increase project costs, but would further inhibit HECO's ability to install
13 needed infrastructure in a timely manner to maintain the reliability of the
14 electrical system in the East Oahu area.

- 15 • Like the section of the Phase 1 route alignment on Kalakaua Avenue, an
16 overhead alignment on King Street may be subject to a City Ordinance
17 (Section 14-22.1, ROH) that requires public utility companies to place their
18 utility lines and related facilities underground whenever certain streets,
19 including King Street, are improved under certain circumstances. Portions of
20 King Street (e.g., from Cooke Street to McCully Street) were improved years
21 ago (e.g., public right-of-way improved, including placing overhead lines
22 underground). Such improvements may have been done at the City's initiative
23 under the improvement district ordinances in which both public and private
24 funds are spent for improvements of the public right-of-way, including utility
25 funds for the placement of overhead lines underground. With significant

1 investment already made over the years to improve this portion of King Street,
2 a proposal to add three new 46kV overhead lines would likely result in
3 opposition from both the public and City government. By proposing to place
4 the new circuits on King Street underground during initial construction,
5 HECO would be able to avoid: (1) future congestion and competition for
6 underground construction space which, based on past experience, drive up
7 costs; (2) additional future construction-related impacts from undergrounding
8 the same project within the same alignment; and (3) removal of critical circuits
9 from service for lengths of time during future underground construction of the
10 same circuits.

11 Q. What is the difference in engineering and construction costs to install the three
12 new 46kV circuits overhead, versus underground as proposed?

13 A. As noted above, approximately one-third of the proposed route alignment along
14 Cooke and King Streets must be placed underground due to State and City laws.
15 The approximate engineering and construction cost to install the remainder of the
16 three new 46kV circuits overhead along King Street from Pensacola Street to
17 McCully Street is estimated to be \$5.2 million. The approximate engineering and
18 construction cost to install the same three circuits all-underground as proposed is
19 estimated to be \$8.6 million. However, notwithstanding the higher engineering
20 and construction costs, it is not practical or prudent to construct these three
21 proposed 46kV circuits overhead given the factors discussed above. Among other
22 considerations, public opposition would be increased by an overhead proposal
23 given the history of this project, which could seriously inhibit meeting the
24 electrical system needs in a timely manner and increase costs significantly.

25 Q. Are there alternative routes for these three new 46kV underground circuits from

1 Archer Substation to McCully Street?

2 A. Yes. Other possible routes for these three new 46kV underground circuits from
3 Archer Substation to McCully Street are via Young Street or Beretania Street.

4 Q. Why were these alternative alignments utilizing Young Street or Beretania Street
5 not selected as the proposed route alignment?

6 A. When compared to the proposed route alignment, these routes utilizing Young
7 Street or Beretania Street have the following disadvantages:

- 8 • Construction of a ductline along Young Street would require more traffic
9 control and coordination because there is only one lane of traffic flow in each
10 direction; and
- 11 • A Beretania Street route would result in a longer distance to interconnect the
12 new 46kV circuits from Archer Substation with the existing 46kV circuits near
13 and on McCully Street.

14 Q. Were routes along Young Street and Beretania Street evaluated as alternative
15 alignments for possible overhead construction of the three new 46kV circuits?

16 A. Yes. However, as detailed in the attached HECO-701, an overhead alignment of
17 three new 46kV circuits along either Young Street or Beretania Street is not
18 practical for the following reasons:

- 19 • Like the proposed King Street route, the first one-third of a route alignment
20 utilizing either Young Street or Beretania Street must be located underground
21 due to State and City laws (the State's Hawaii Community Development
22 Authority Kakaako Community Development District, and the City's Thomas
23 Square/Honolulu Academy of Arts Special Design District);
- 24 • Young Street is a relatively narrow road with existing 12kV overhead lines
25 along the route. The addition of 60 to 70 foot steel poles on both sides of

- 1 Young Street to accommodate three new 46kV circuits and the existing 12kV
2 circuits give rise to engineering concerns for conflicting lines and significant
3 visual impacts;
- 4 • An overhead alignment along Young Street will be subject to coordination
5 with the City's proposed Young Street Park Boulevard Project, in which plans
6 call for possible undergrounding of existing utilities and planting of canopy
7 trees;
 - 8 • All existing 46kV lines along Beretania Street in the area from Pensacola
9 Street to Alexander Street are underground. With the addition of new 60 to 70
10 foot steel poles on Beretania Street, public opposition to the visual impacts
11 would likely occur resulting in costly project delay;
 - 12 • Like King Street and Kalakaua Avenue, Beretania Street is also subject to the
13 same City ordinance (Section 14-22.1, ROH) that requires utilities to be
14 placed underground when the specified streets are improved under certain
15 circumstances; and
 - 16 • Both Young and Beretania Streets have several large trees of unknown species
17 that extend and overhang into the roadway at various locations between
18 Pensacola Street and McCully Street, requiring either removal or significant
19 initial trimming to accommodate construction.

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SUMMARY

22

Q. Please summarize your testimony.

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A. In Phase 1 of the proposed 46kV Phased Project, two new 46kV underground

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circuits are proposed for installation in a common ductline between the existing

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Makaloa and McCully Substations. These two new 46kV circuits are an upgrade

1 to and will replace the three existing smaller capacity 46kV underground circuits
2 between the two substations. The proposed route of the two new 46kV circuits
3 will follow the same route as the three existing 46kV circuits, utilizing Makaloa
4 Street, Kalakaua Avenue, Fern Street, Hauoli Street and Lime Street, although an
5 alternative using Kapiolani Boulevard is still under consideration. HECO intends
6 to further investigate, and to the extent feasible, utilize the existing ductline
7 housing the existing three 46kV circuits to be replaced. The ability to reuse the
8 existing ductline could potentially reduce the cost of placing the two new 46kV
9 circuits underground and shorten the construction schedule. It would also
10 minimize the extent of construction impacts and trenching in area roadways. In
11 Phase 2 of the project, three new 46kV underground circuits are proposed for
12 installation in a common ductline from the Archer Substation to McCully Street
13 via Cooke Street and King Street. Approximately one-third of the entire length of
14 these proposed new circuits must be placed underground due to State and City
15 laws.

16 For the most part, it would be neither practical nor prudent to construct these
17 proposed new 46kV circuits overhead given State and City laws governing
18 portions of the route, engineering considerations, the history of this project and
19 probable opposition to overhead construction, and the pressing need to resolve the
20 East Oahu transmission system concerns. If certain sections of these new 46kV
21 circuits were proposed for overhead construction, the potential for significant
22 project delays and increased costs would be great. And any potential savings in
23 engineering and construction costs associated with an overhead line proposal
24 could easily disappear if approvals and permits for the project were delayed.
25 Installing the various 46kV circuits underground provides the best opportunity to

1 meet the underlying need for this project in a timely and cost-effective manner.

2 Q. Does this conclude your testimony?

3 A. Yes, it does.

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