

ALAN M. ARAKAWA
Mayor

DAVID C. GOODE
Director

ROWENA M. DAGDAG-ANDAYA
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955



GLEN A. UENO, P.E., P.L.S.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

LESLI L. OTANI, P.E., L.S.
Highways Division

RECEIVED

2017 JAN 13 PM 2:26

COUNTY OF MAUI OFFICE OF THE MAYOR
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

January 13, 2017

Honorable Alan M. Arakawa
Mayor, County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793

For Transmittal to:

Honorable Elle Cochran, Chair
Infrastructure and Environmental
Management Committee
Maui County Council
200 South High Street
Wailuku, Maui, Hawaii 96793

APPROVED FOR TRANSMITTAL



Mayor Date 1/17/17

Dear Chair Cochran:

**SUBJECT: LOWER NAHIKU BRIDGE HEALTH AND SAFETY
CONCERNS (NAHIKU) (IEM-10)**

The Department of Public Works is in receipt of your letter dated September 22, 2016 regarding the above-referenced subject. The Department apologizes for the delay in our response, and offers the following responses to your request for information.

1. *A copy of the title report for the land.*

See attached title report labeled Exhibit 1.

2. *A copy of the latest structural assessment completed, to date*

See attached structural assessments labeled Exhibit 2 and Exhibit 3.

Honorable Alan M. Arakawa
For Transmittal to:
Honorable Elle Cochran, Chair
January 13, 2017
Page 2

3. *A copy of the latest inspection report completed, to date.*

See attached structural assessments labeled Exhibit 2 and Exhibit 3.

4. *Detailed list of all maintenance work performed on the bridge by the County, to date, including cost. Include how the County paid for the maintenance work performed.*

Our Highways Division Hana District staff reported that major repairs to the subject bridge were made in November of 1988 by the Department of Public Works using operational funds. The work involved the replacement of several bridge structures which included the decking, posts, and the railings. The exact cost of the repairs could not be provided. This project was not considered a Capital Improvement Project.

Since 1988, no major work has been done to the bridge, with the exception of minor changes involving the replacement of the wooden side barriers and the decking planks. These repairs would have been funded through district operational funds.

5. *A map that clearly outlines the location of the bridge with respect to the surrounding properties, including ownership of the properties.*

See attached map labeled Exhibit 4.

6. *The Department's recommendation for repair or replacement of the bridge, including estimates and timeline for repair or replacement. If replacement of the bridge is recommended, also include costs for removal and permitting.*

The Department anticipates that the replacement of the bridge may require the following permits: 1) Environmental Assessment; 2) Special Management Area Permit Application, 3) Department of Army Permit; and 4) Section 401 Water Quality Certification. Based on current permitting costs incurred by other similar bridge rehabilitation projects, the costs are estimated to range between \$300,000 to \$500,000. The timeline for permitting is anticipated for approximately 18 to 24 months.

A cost estimate was prepared in 2012 for the replacement of the wooden bridge with a metal Acrow Bridge. This Acrow Bridge had been previously

Honorable Alan M. Arakawa
For Transmittal to:
Honorable Elle Cochran, Chair
January 13, 2017
Page 3

used as a temporary bridge during the reconstruction of one of our bridges in Hana, and its components are currently stored at our Hana District Baseyard. The cost estimate for the installation of the bridge was estimated at \$798,000 and may involve the following scope of work:

- a. The Acrow Bridge would be constructed over the existing wooden deck without disturbance to the existing wooden structure with the exception of removing the metal guardrails.
- b. Construction of reinforced concrete fittings behind the existing abutments.
- c. A two (2) foot asphalt concrete cap at the approach of the embankments.
- d. Metal guardrails and end treatments.
- e. Striping and signage.
- f. The cost estimate also includes a \$10,000 allowance for the cost of relocation for residents affected by the bridge work.

The final cost of the bridge replacement may be slightly more or less, depending on any additional work or extra parts required for the bridge. Approximate construction duration is six (6) weeks.

7. *If the County is willing to pay for repair or replacement costs, identify the funds that could be used, including whether Federal funding is available.*

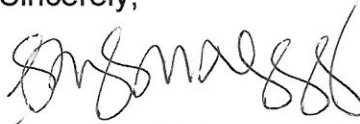
To be eligible for Federal funding, a bridge must be a highway bridge that carries a public road. The attached title report provides that the property on which the subject bridge was constructed on is private property. The subject bridge does not carry a public road, making it ineligible for Federal funding.

Should the County Council approve funds for the replacement of the subject bridge, the Department of Public Works recommends that a separate Capital Improvement Program line item be created for the following tasks: 1) land acquisition, 2) design, and 3) construction.

Honorable Alan M. Arakawa
For Transmittal to:
Honorable Elle Cochran, Chair
January 13, 2017
Page 4

If you have any questions regarding this letter, please contact me at Ext. 7845.

Sincerely,



DAVID C. GOODE
Director of Public Works

DCG:RMDA:jso

Attachments

xc: Office of the Mayor
Department of the Corporation Counsel
Highways Division

S:\PWADMIN\Jso\Rowena\TRANSMITTALS\ecochran_nahiku.doc

STATUS REPORT

This Report (and any revisions thereto) is issued for the sole benefit of the Purchaser of this Report identified in the Order No. referenced below. Title Guaranty of Hawaii, Incorporated's responsibility for any actual loss incurred by reason of any incorrectness herein is limited to the lesser of \$3,500 or two times the amount paid for this Report.

SCHEDULE A

Title Guaranty of Hawaii, Incorporated, hereby reports as follows as to the title of the Parties named in Schedule A in and to the title to land described in Schedule C, subject to the matters set forth in Schedule B, based solely upon an abstract and examination of the following Indices in the State of Hawaii: (a) the Office of the Clerks of the Circuit Court of the Judicial Circuit within which the land is located; (b) the Office of the Clerk of the District Court of the United States for the District of Hawaii; (c) the Office of the Registrar of Conveyances; and (d) the Office of the Real Property Tax Assessment Division of the County within which the land is located.

GOVERNMENT OF HAWAII
as Fee Owner
-AS TO PARCEL FIRST-

This report is subject to the Conditions and Stipulations set forth in Schedule D and is dated as of December 12, 2014 at 8:00 a.m.

Inquiries concerning this report
should be directed to
KYLE AJIFU.
Email kajifu@tghawaii.com
Fax (808) 533-5870
Telephone (808) 533-5873.
Refer to Order No. 201445268.

EXHIBIT " 1 "

**SCHEDULE B
EXCEPTIONS**

1. Taxes - none

Tax Key: none; within the following zone, section and plat (2) 1-2-002 and (2) 1-2-003, as shown in BLUE and PINK on the map attached hereto and marked as EXHIBIT "A".

2. Any and all Real Property Taxes that may be due and owing.

Tax Key: none; within the following zone, section and plat (2) 1-2-002 and (2) 1-2-001, as shown in YELLOW on the map attached hereto and marked as EXHIBIT "A".

3. Any and all matters not shown in the Indices described in Schedule A.

4. -AS TO PARCEL FIRST (B) (land shown in PINK on the map attached hereto and marked as EXHIBIT "A"):-

The terms and provisions contained in the following:

INSTRUMENT : DEED

DATED : December 12, 1898

RECORDED : Liber 1074 Page 80

The foregoing includes, but is not limited to, matters relating to:

"Provided that the said party of the second part shall allow the son of said party of the first part, P. K. Kalohelau Jr. to take up a Homestead of eight acres plus an equal amount of land as above stated to be conveyed by said party of first part to said party of second part, i. e. 10.35 acres in all, in a location adjacent to L.C.A. 4849 Apana 3, it being understood that any legal disability of said P. K. Kalohelau Jr. to acquire a homestead shall render the terms of this agreement null and void."

SCHEDULE B CONTINUED

5. -AS TO PARCEL SECOND, (land shown in YELLOW on the map attached hereto and marked as EXHIBIT "A"):-

We are unable to make a legal determination as to the ownership of the land shown in YELLOW on the map attached hereto and marked as EXHIBIT "A".

We have no evidence of title to the GOVERNMENT OF HAWAII in and to the road as it passes along portions of Tax Keys [redacted] and [redacted], and through Tax Keys [redacted], [redacted] and [redacted].

The following are the titleholders of the properties adjoining the roadway as shown in the records at the County of Maui Real Property Assessment Division:

- 1) TMK: [redacted]

EAST MAUI IRRIGATION
PAULINE ALEJADO
THOMAS B. ALEJADO
PETER FRANKLIN BAL
ANDREW J. BELMODIS
YVONNE S. BELMODIS
YVETTE CAROL KAHAUOLOPUA, a.k.a. YVETTE B. KAHAUOLOPUA
DOLORES E. KAHOOKELE REVOCABLE TRUST
HERBERT K. KAHOOKELE REVOCABLE TRUST
SHIRLEY C. KAHOOKELE

- 2) TMK: [redacted]

ALAN M. UCHIYAMA
RYAN TSUGIO UCHIYAMA

SCHEDULE B CONTINUED

The following are the titleholders of the properties of which the roadway passes through, as shown in the records of the County of Maui Real Property Assessment Division:

1) TMK: 211-102-01-005

EAST MAUI IRRIGATION
PAULINE ALEJADO
THOMAS ALEJADO

2) TMK: 211-1-011-010

STATE OF HAWAII

3) TMK: 211-1-011-015

STATE OF HAWAII

6. Rights of others who may have easement or access rights in the land described in Schedule C.
7. Discrepancies, conflicts in boundary lines, shortage in area, encroachments or any other matters which a correct survey or archaeological study would disclose.

END OF SCHEDULE B

SCHEDULE C

-FIRST:-

- (A) All of that certain parcel of land, being a portion of the Government Land of Makapipi, situate, lying and being at Nahiku, District of Koolau (Hana), Island and County of Maui, State of Hawaii, as shown in BLUE on the map attached hereto and marked as EXHIBIT "A".

-Note:- We find no recorded evidence of the land shown in BLUE as having been conveyed or transferred by the GOVERNMENT OF HAWAII.

- (B) All of that certain parcel of land (being portion of the land(s) described in and covered by Apana 3 of Royal Patent Number 4849 to Kalohelau) situate, lying and being at Makapipi, Nahiku, District of Koolau (Hana), Island and County of Maui, State of Hawaii, as shown in PINK on the map attached hereto and marked as EXHIBIT "A".

DEED

GRANTOR : P. K. KALOHELAU
GRANTEE : J. F. BROWN, Agent of Public Lands, for the use and benefit of the Republic of Hawaii
REC DATE : December 12, 1898
RECORDED : Liber 1000 Page 1000

-SECOND:-

All of that certain parcel of land as shown in YELLOW on the map attached hereto and marked as EXHIBIT "A".

END OF SCHEDULE C

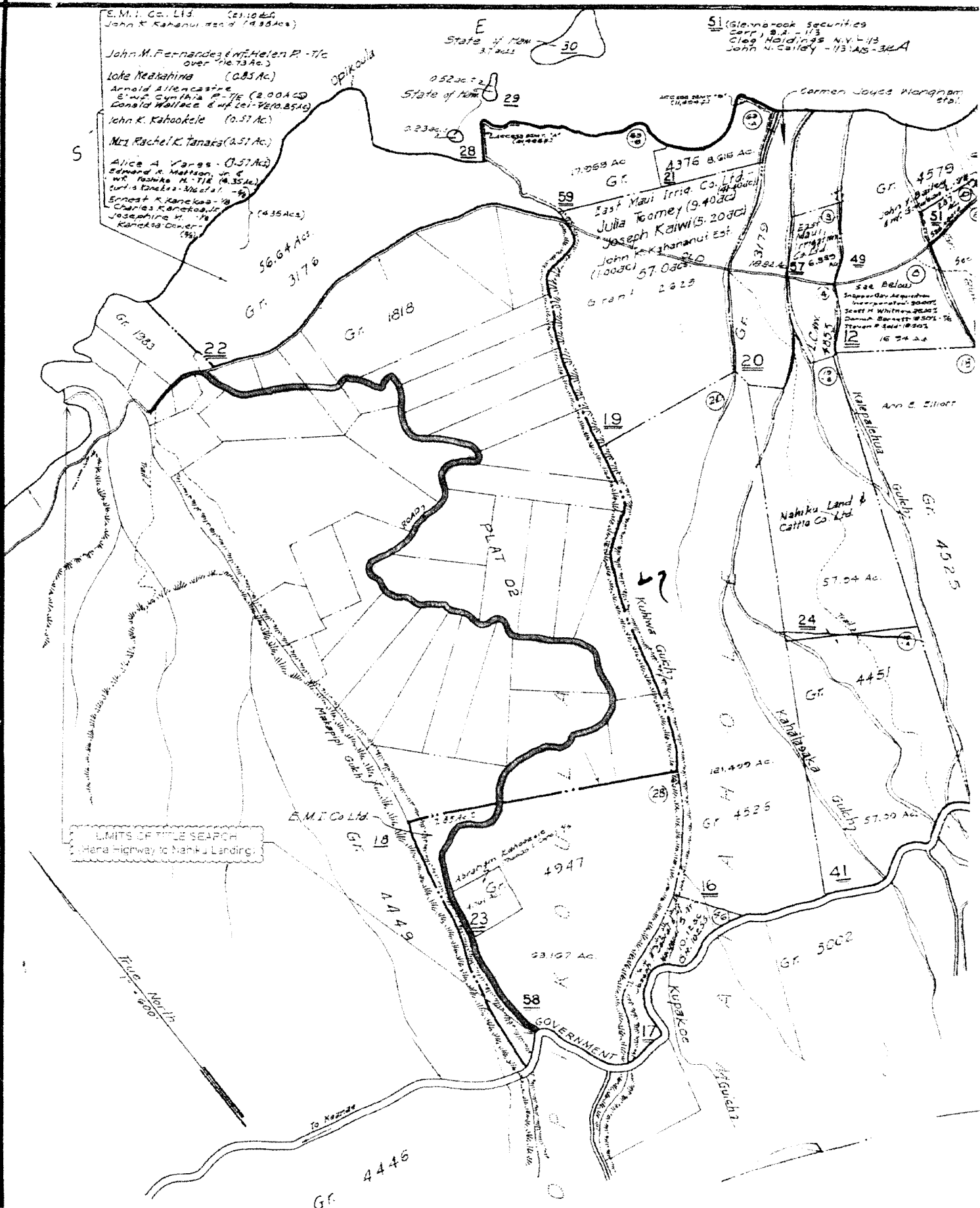
GENERAL NOTES

1. There is hereby omitted from any covenants, conditions and reservations contained herein any covenant or restriction based on race, color, religion, sex, sexual orientation, familial status, marital status, disability, handicap, national origin, ancestry, or source of income, as set forth in applicable state or federal laws, except to the extent that said covenant or restriction is permitted by applicable law. Lawful restrictions under state or federal law on the age of occupants in senior housing or housing for older persons shall not be construed as restrictions based on familial status.

SCHEDULE D

CONDITIONS AND STIPULATIONS

1. This Status Report (which term shall include any revisions thereto) is a report of the record title only, based solely upon an abstract and examination of the Indices described in Schedule A as of the date of the Report. No responsibility is assumed for (a) matters which may affect the title but either were not disclosed or were incorrectly disclosed in said indices at the date hereof; or (b) matters created, suffered, assumed, or agreed to by Purchaser; or (c) matters not shown herein but actually know to Purchaser. Title Guaranty of Hawaii, Incorporated (the "Company") makes no representation as to the legal effect, validity or priority of matters shown or referred to herein.
2. If the Report is incorrect in any respect, the responsibility of the Company shall be limited to the resulting actual loss, including any attorney's fees and legal costs, but in no event shall exceed the lesser of \$3,500 or two times the amount paid for the Report. Upon payment of any loss hereunder, the Company shall be subrogated to all rights the Purchaser may have against any person or property as a result of such loss.
3. If the Purchaser of this Report shall suffer an actual loss by reason of the incorrectness of the Report, the Purchaser shall promptly notify the Company in writing. After receipt of such notice, the Company shall be allowed a reasonable time in which to investigate the claim. At its sole option, the Company may litigate the validity of the claim, negotiate a settlement or pay to Purchaser the amount the Company is obligated to pay under this Report. The Company's responsibility hereunder constitutes indemnity only and nothing herein shall obligate the Company to assume the defense of the Purchaser with respect to any claim made hereunder.
4. This report is the entire contract between the Purchaser and the Company and any claim by Purchaser against the Company, arising hereunder, shall be enforceable only in accordance with the provisions herein.
5. Notice required to be given the Company shall include the Order Number of this Report and shall be addressed to Title Guaranty of Hawaii, Inc., P.O. Box 3084, Honolulu, HI 96802, Attention: Legal Department.



E.M.I. Co. Ltd. (63,104 Ac)
John K. Kahanaui head (9,984 Ac)

John M. Fernandez & Helen P. Fernandez
Over (16,73 Ac)
Lake Keahuna (6.85 Ac)
Arnold Allen estate
East Maui P. T. Co. (2,000 Ac)
Donald Wallace & wife (21,854 Ac)
John K. Kahookole (0.57 Ac)
Mrs. Rachel K. Tanaka (0.57 Ac)

Alice A. Vargas (0.57 Ac)
Edmond K. Mattson, Jr.
Mrs. Kahiaka K. T. (4,35 Ac)
John's Estate (10.57 Ac)
Ernest K. Kanihaka
Charles Kanihaka, Jr.
Josephine M. Kanihaka
Kanihaka Estate (19.57 Ac)

E
State of Hawaii 37,222 30

51 (Glennbrook Securities Corp.) 21,113
Clay Holdings N.Y. - 113
John H. Colby - 113,145 - 32A

0.52 Ac
State of Hawaii 29

17,959 Ac
Gr. 4376 8,616 Ac
East Maui Irrigation Co. Ltd.
Julia Toomey (9,403 Ac)
Joseph Kaiwi (5,203 Ac)
John K. Kahanaui Est. (1,003 Ac)
57,000 Ac
Grant 2229

See Below
James Gov. Anderson
Incorporated 1900
Scott H. Whitman 1902
Thomas S. Barrett 1901
Thomas S. Barrett 1901
16,74 Ac

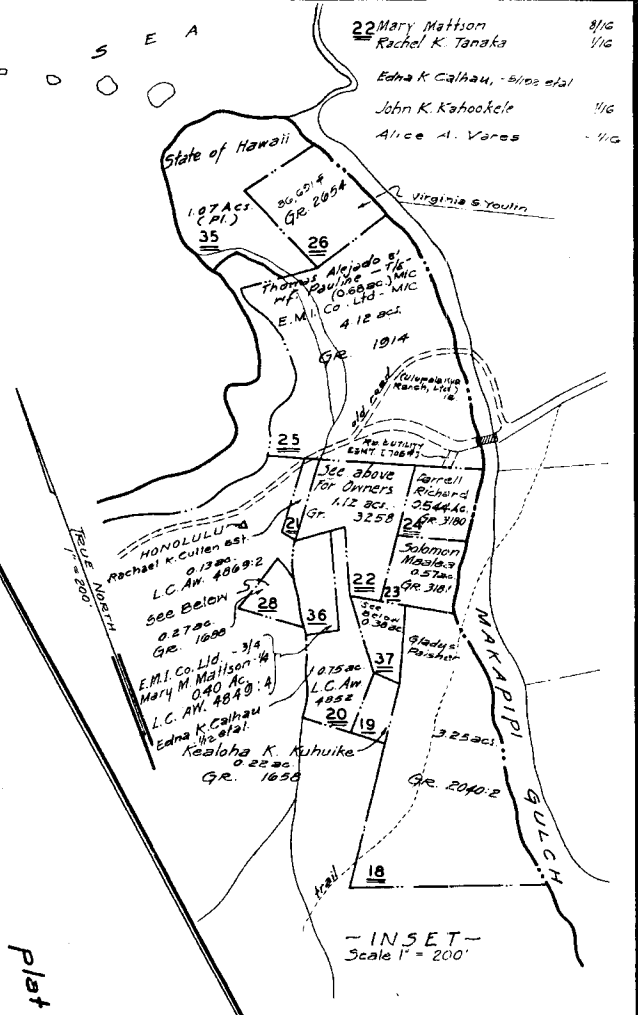
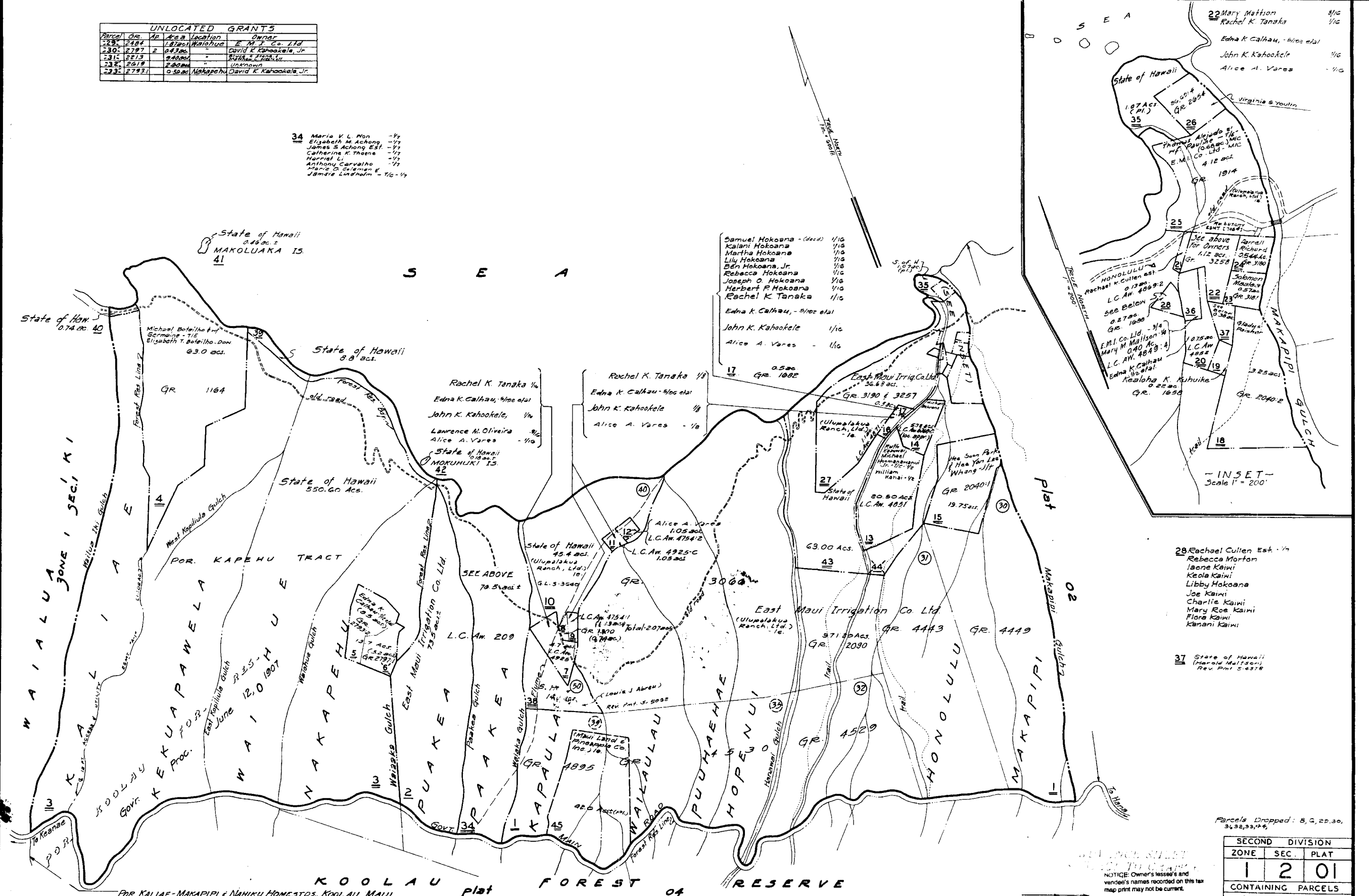
LIMITS OF TITLE SEARCH
Hana Highway to Nahaia Landing

EXHIBIT "A"

CORRECTED
 1933
 1939
 1940
 1941
 1942
 1943
 1944
 1945
 1946
 1947
 1948
 1949
 1950
 1968
 1970
 1972
 1973
 1974
 1975
 1976
 1977
 1978
 1979
 1980
 1981
 1982
 1983
 1984
 1985
 1986
 1987
 1988
 1989
 1990
 1991
 1992
 1993
 1994
 1995
 1996
 1997
 1998
 1999
 2000
 2001
 2002
 2003
 2004
 2005
 2006
 2007
 2008
 2009
 2010
 2011
 2012
 2013
 2014
 2015
 2016
 2017
 2018
 2019
 2020

Parcel	Gr.	Ac.	Location	Owner
29	2484	1.82ac	Waiolu	E. M. J. Co. Ltd.
30	2797	2.03ac	"	David K. Kahookela, Jr.
31	2213	0.40ac	"	Elizabeth Zissel, Jr.
32	2619	2.00ac	"	Unknown
33	2793	0.50ac	Nakapehu	David K. Kahookela, Jr.

- 34 Maria V. L. Mon - 1/2
 Elizabeth M. Achong - 1/2
 James S. Achong Est. - 1/2
 Catherine K. Thorne - 1/2
 Harriet Li - 1/2
 Anthony Carvalho - 1/2
 Maria O. Salomon & Jamie Lundholm - 1/2-1/2



- 28 Raehel Cullen Est. - 1/2
 Rebecca Morton
 Jaone Kaiwi
 Keola Kaiwi
 Libby Hokoana
 Joe Kaiwi
 Charlie Kaiwi
 Mary Roe Kaiwi
 Flora Kaiwi
 Kanani Kaiwi

37 State of Hawaii (Hawaii Malitson) Rev. Pmt. 5.4376

Parcels Dropped: B, G, 20, 30, 31, 32, 33, 34

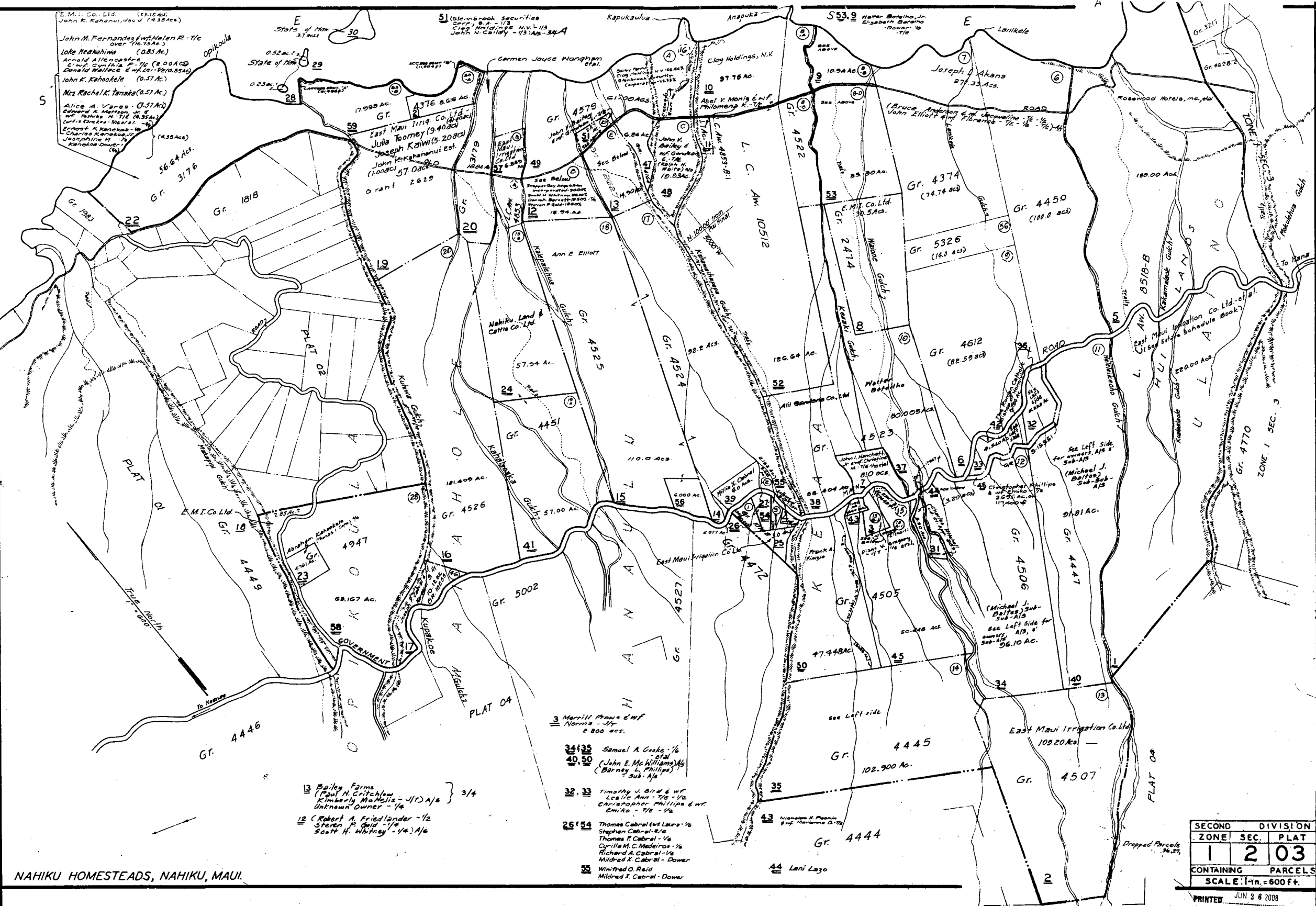
SECOND DIVISION		
ZONE	SEC.	PLAT
1	2	01
CONTAINING PARCELS		
SCALE: 1 in. = AS NOTED		

PRINTED JAN 10 2008

Div. No. 2005
 Source: Survey Dept. (Reg. Map 2422) Tax Maps Bureau
 By: H.N.L.L.K. June 1934 (Revised Aug. 1937)

FOR KALIAE-MAKAPIPI & NAHIKU HOMESTDS, KOOLAU, MAUI

1932
 1933
 1934
 1935
 1936
 1937
 1938
 1939
 1940
 1941
 1942
 1943
 1944
 1945
 1946
 1947
 1948
 1949
 1950
 1951
 1952
 1953
 1954
 1955
 1956
 1957
 1958
 1959
 1960
 1961
 1962
 1963
 1964
 1965
 1966
 1967
 1968
 1969
 1970
 1971
 1972
 1973
 1974
 1975
 1976
 1977
 1978
 1979
 1980
 1981
 1982
 1983
 1984
 1985
 1986
 1987
 1988
 1989
 1990
 1991
 1992
 1993
 1994
 1995
 1996
 1997
 1998
 1999
 2000
 2001
 2002
 2003
 2004
 2005
 2006
 2007
 2008
 2009
 2010
 2011
 2012
 2013
 2014
 2015
 2016
 2017
 2018
 2019
 2020



NAHIKU HOMESTEADS, NAHIKU, MAUI

- 3 Merrill Proulx & Wf Norma - 2,800 acs.
- 34, 35 Samuel A. Cooke - 1/4 et al (John E. McWilliams & Wf Bernice Sub-A's)
- 32, 33 Timothy J. Bird & Wf Leala Ann - 1/2 - 1/2 Christopher Phillips & Wf Emiko - 1/2 - 1/2
- 25, 26, 27, 28 Thomas Cabral (w/ Laura - 1/2 Stephen Cabral - 1/2 Thomas P. Cabral - 1/2 Cyrille M. C. Medeiros - 1/2 Richard A. Cabral - 1/2 Mildred X. Cabral - Dowry Winifred O. Reid Mildred X. Cabral - Dowry
- 43 Nicholas H. Proulx & Wf Marianne O. - 1/2
- 44 Lani Lazo

SECOND DIVISION		
ZONE	SEC.	PLAT
1	2	03
CONTAINING PARCELS		
SCALE: 1 in. = 600 Ft.		

PRINTED JUN 26 2008

NAGAMINE OKAWA ENGINEERS INC.

CONSULTING STRUCTURAL ENGINEERS

1003 Bishop Street
Pauahi Tower, Suite 2025
Honolulu, Hawaii 96813
Tel: (808) 536-2626

September 12, 2011

Proj. no. 10076.01

Department of Public Works, Engineering Division
Maui County
Kalana O Maui Building
200 South High Street
Wailuku, Hawaii 96793

Attention: **Mr. Teddy Maulit, Project Engineer**

Subject: **Nahiku Bridge Structural Assessment
Lower Nahiku Road near Hana Highway, Route 360 M.P. 25
Maui, Hawaii**

Dear Teddy,

As requested, a field survey of the Nahiku Bridge was performed by Nagamine Okawa Engineers Inc. (NOEI) on September 1, 2011. The purpose of this field survey was to assess the structural condition of the bridge and to determine the maximum weight of vehicles that can cross the bridge. Our structural comments and recommendations are as follows:

A. Scope of Work:

The scope of work included a field survey of the bridge and a brief letter report. The letter report includes opinions and recommendations on the weight of vehicle that can cross the bridge. The report is based on visual observations of components and defects which were readily visible. NOEI team members for this assessment included structural engineer Karl Umemoto and bridge inspector Eric House. Both team members are certified bridge inspectors.

Recommendations indicated in this report are based on field observations and measurements, and limited structural calculations. No existing record bridge plans were available for review.

B. Description of existing bridge structure:

The Nahiku Bridge is a one-lane timber bridge that crosses over the Makapipi Stream (see Photos 1 thru 4). The bridge has an overall length of 37 feet between abutments, including two unequal spans. The Makapipi stream flows under the longer Makai span of the bridge. It is unknown when this bridge was originally built, and it is currently not on the Maui County's inventory list of bridges.

The bridge deck and riding surface consists of 4 x 12 timber planks which span in the transverse direction of the bridge. The planks are equally spaced with 1-1/2 inch gaps between each plank. The bridge superstructure consists of two unequal spans of 21 feet (Makai span) and 16 feet (Mauka span). The timber planks at the Makai span are supported on eight (8) 6 x

EXHIBIT "2"

12 timber girders. The Mauka span consists of ten (10) 6 x 12 timber girders. The timber girders from both spans are lapped several feet over the pier. The bridge superstructure is supported on CRM abutments and an intermediate timber post and beam pier structure bearing on a CRM base.

The upper portion of the pier structure consists of a built-up timber cap beam supported on three equally spaced built-up timber columns. The built-up pier cap beam consists of two 6 x 12's placed side-by-side and bolted together. The upstream and center built-up columns consist of two 6 x 12's bolted together. The downstream built-up column consists of two 6 x 12 timber members placed side-by-side and connected together with an outer-layer of plywood panels nailed to each 6 x 12 member. The columns are laterally braced in the plane of the pier by 4 x 12 diagonal bracing at upstream half of pier and by 2 x 12 horizontal struts at the downstream half of the pier.

The lower portion of the pier structure consists of a CRM wall approximately 5 to 6 feet tall that bears on a sloping channel floor consisting of rocks and boulders.

Both abutments consist of CRM walls that appear to bear on rock. The heights of the Mauka and Makai abutment walls are approximately 15 feet and 20 feet, respectively.

C. Observations and comments:

1. The timber planks generally appear to be in fair condition.
2. The 6 x 12 timber girders generally appear to be in fair condition. The bottom bearing ends of several girders over the pier and at both abutments were soft when probed with a screwdriver. This soft condition appears to be due to water damage and wood rot (see Photo 5). At a few of the Mauka span girders near the pier, the top 1-inch depth of the girders has severe wood rot.
3. The built-up pier cap 6 x 12 timber beams generally appear to be in fair condition.
4. The built-up 6 x 12 timber pier columns generally appear to be in poor condition. One of two 6 x 12 members at both the upstream and center columns is rotted at the base (see Photo 6). The upstream pier column does exhibit a slight curvature in the plane of the pier. Both members of the downstream column is severely rotted at the base (see Photo 7). However, no signs of crushing, settlement, or other obvious vertical movement in the downstream column, cap beam or superstructure were observed.
5. A few of the timber cover plates are severely deteriorated around the connection bolts at the pier column to cap beam connections
6. One diagonal 4 x 12 timber brace member is severely rotted with about 50% section loss at midspan of the member (see Photo 8). These diagonal members provide lateral support for the timber columns. A failure of a diagonal member could affect the vertical load-carrying capacity of the columns and overall lateral stability of the timber pier.
7. Bridge railings consist of a single w-beam guardrail and steel posts bolted to the timber

planks. Existing bridge railing does not appear to meet current acceptable safety standards for vehicular, bicycle and pedestrian traffic.

8. No approach guardrails exist at both approaches to the bridge.
9. Vehicle weight limit warning signs were not posted at the bridge approaches.

D. Conclusions and Recommendations:

1. Based on the existing current condition of the bridge, the gross vehicle weight should be limited to a maximum of 5,000 lbs., or a maximum axle load of 3,000 lbs., whichever is smaller.
2. Assuming the damaged elements of the bridge are repaired and restored to its original as-built condition, the gross vehicle weight limit could be increased to a maximum of 6,000 lbs., or a maximum axle load of 4,000 lbs., whichever is smaller.
3. Recommend load posting (or vehicle weight limit) warning signs be installed at both ends of the bridge.
4. Short-term temporary shoring and repair:
 - a. Immediately shore and brace the timber pier structure until the severely damaged elements such as the timber columns, diagonal bracing and timber connection plates are properly repaired or replaced. The temporary shoring and bracing should be installed if the bridge is currently being used.
 - b. We understand that the County would like to drive heavy equipment and vehicles with a gross vehicle weight of up to 31,000 lbs. across the bridge. Recommend that the superstructure girders and pier structure cap beams and columns be shored and braced to support the heavier loads. The superstructure girders should be shored at intermediate points within each span. If possible, the wheels of the vehicles should be aligned over an existing girder below the deck as the vehicle travels across the bridge. Otherwise, the existing timber planks should be shored or strengthened. One option of temporarily strengthening the timber planks is to place steel plates over the planks and over at least two adjacent girders along each wheel line.
5. Long-term repair options for consideration:
 - a. Replace existing bridge with a new bridge that would meet current acceptable bridge design standards.
 - b. In lieu of replacing bridge, repair, strengthen and/or upgrade major structural elements of the bridge as necessary to achieve the desired load-carrying capacity.

Mr. Teddy Maulit
DPW Engineering, Maui County
September 12, 2011
Page 4

E. Other comments

1. The effects of lateral loads due to wind and earthquake, foundations and scour were not addressed in this letter report.
2. Structural repair drawings and specifications for the short-term and long-term repairs are not included in this letter report.
3. The field survey and inspection that was performed is not considered comprehensive enough to satisfy as a NBIS bridge inspection.

No warranty is expressed or implied by this letter report.

If there are any questions or comments, please feel free to contact us.

Very truly yours,
Nagamine Okawa Engineers Inc.



Karl Umemoto, S.E.
Structural Engineer

Attachments: Photos

Cc: Dwight Okawa / NOEI



PHOTO 1 Mauka Approach to Bridge



PHOTO 2 Makai Approach to Bridge

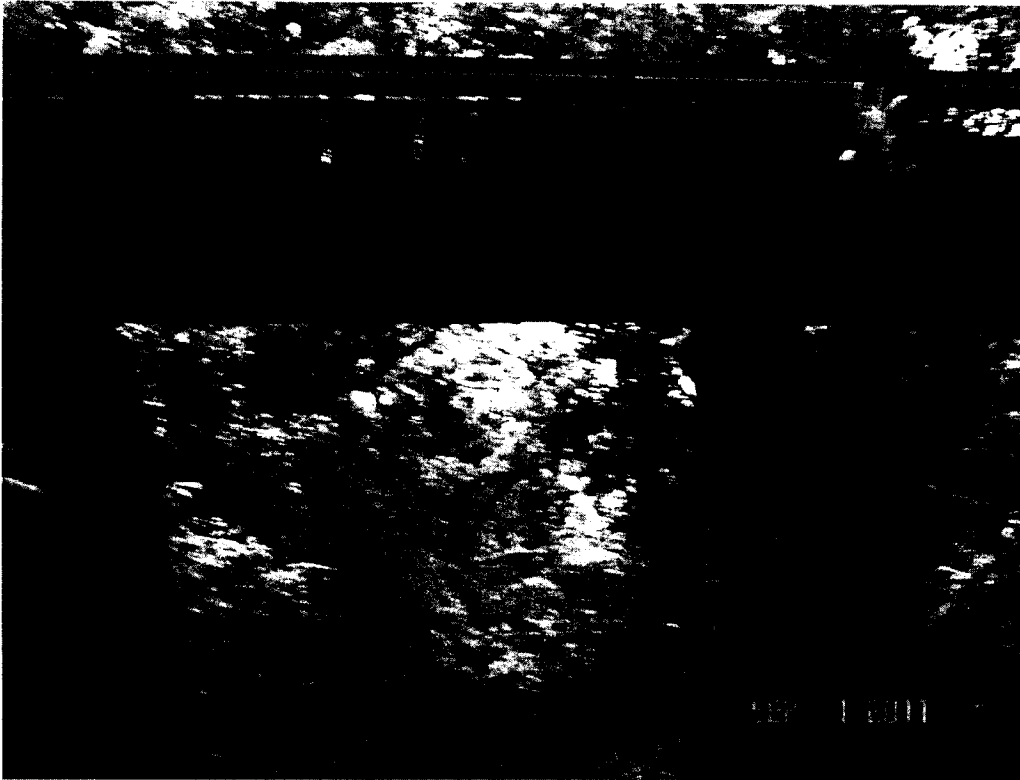


PHOTO 3 Makai Span and Pier, looking downstream



PHOTO 4 Mauka Span and Pier, looking downstream



PHOTO 5 Wood rot in bottom of girders and top of pier cap beam



PHOTO 6 Wood rot in base of upstream pier column

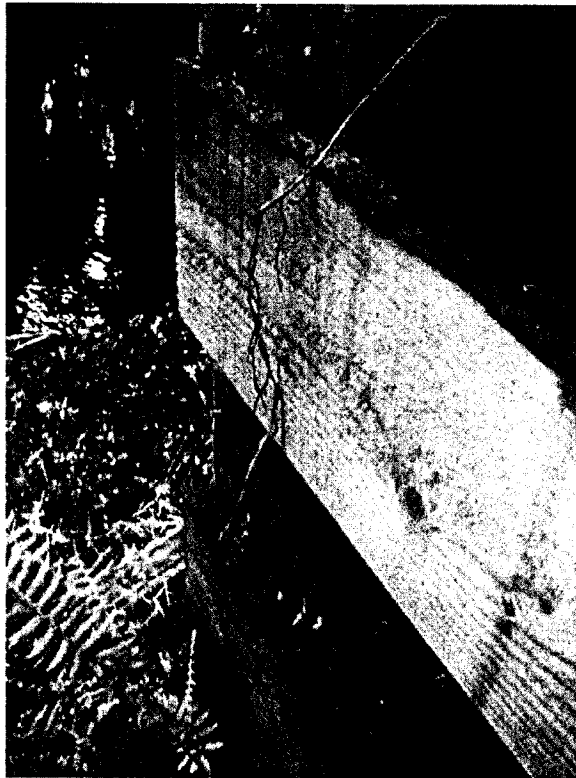


PHOTO 7 Severe wood rot in downstream pier column



PHOTO 8 Severe wood rot and section loss at midspan of diagonal bracing



Consulting Structural Engineers

NAGAMINE OKAWA ENGINEERS INC.

1003 Bishop Street
Pauahi Tower Suite 2025
Honolulu, Hawaii 96813
Tel: (808)536-2626
Fax: (808)536-3926
Email: dwighto@nagamineokawa.com

October 22, 2014

Proj. No. 13060.02/10076.01

Department of Public Works, Engineering Division
Maui County
Kalana O Maui Building
200 South High Street
Wailuku, Hawaii 96793

Attention: Mr. Teddy Maulit, Project Engineer

Subject: Nahiku Bridge Condition Assessment No. 2
Lower Nahiku Road near Hana Highway, Route 360 M.P. 25
Maui, Hawaii

Dear Mr. Maulit,

As requested, a second condition assessment of the Nahiku Bridge was performed by Nagamine Okawa Engineers Inc. on October 22, 2014. The first condition assessment was conducted by our office on September 12, 2011. The purpose of the condition assessments was to document the condition of the bridge and to determine the maximum vehicle weight that can safely cross over the bridge. No existing as-built drawings were available for our review. Our structural observations and recommendations are as follows:

DESCRIPTION OF EXISTING BRIDGE

The Nahiku Bridge is a one-lane timber bridge crossing over Makapipi Stream. The travel way width on the bridge measured 11 feet between metal guardrails that are located along the upstream and downstream sides of the bridge (Photos 1). It is unknown when the bridge was originally built.

The bridge has an overall length of approximately 37 feet measured between the mauka and makai abutments. The superstructure consists of two unequal spans of 21 feet (makai span) and 16 feet (mauka span). The substructure consists of CRM abutments at the mauka and makai ends of the bridge and an intermediate timber framed pier.

The bridge deck and riding surface consists of thirty five 4 x 12 timber planks laid transversely across the bridge with varying gaps between planks of about 1-1/2 inches (Photos 1). The timber planks were supported on eight 6 x 12 timber girders at the makai span (Photos 2) and ten 6 x 12 timber girders at the mauka span (Photos 3). The timber girders are lapped several feet over an intermediate pier (Photos 4).

The timber pier consists of two 6 x 12 pier cap beams bolted together side-by-side and supported on three equally spaced timber columns which bear on timber plates on top of a concrete base wall (Photos 5). The upstream timber column consists of three 6 x 12 timber members two of which are oriented side-by-side and the third oriented perpendicular to the two side-by-side 6 x 12. The center timber column consists of four 6 x 12 timber members of two are oriented side-by-side and the third and fourth are oriented perpendicular to the two side-by-side 6 x 12, one at the upstream end and one at the downstream end of the side-by-side 6 x 12's. The downstream timber column consists of three 6 x 12 timber members all placed side-by-side to one another. The three columns are laterally braced in the plane of the pier by 4 x 12 timber diagonal bracing members and by a 2 x 12 timber horizontal member between the center and downstream columns.

The lower portion of the pier structure consists of a concrete wall approximately 5 to 6 feet tall bearing on a sloping channel floor consisting of rocks and boulders (Photos 6).

Both abutments consist of CRM walls that appear to bear on rock. The heights of the mauka and makai abutment walls are approximately 12 feet and 16 feet, respectively.

RESULTS OF VISUAL INSPECTION AND FIELD INVESTIGATION

A visual inspection and field investigation were performed by Dwight M. Okawa, S.E. and Eric House on October 22, 2014. No as-built drawings were available for our review. The following are the results of our inspection:

1. Bridge Railing: The bridge railings consist of a single W-beam guardrail and steel posts bolted or nailed to the timber deck planks (Photos 1 & 7). The existing bridge railings do not meet current acceptable standards for vehicular, bicycle or pedestrian traffic. No approach guardrails exist at both approaches to the bridge.
2. 4 x 12 Deck Planks: The timber planks are in poor to fair condition. A few planks have section loss due to decay and a majority of the planks are weathered and decayed to some degree. Three areas of the deck are covered with plywood sheathing (Photos 1 & 8).
3. 6 x 12 Girders: The ten 6 x 12 timber girders in the mauka span are in poor to critical condition. The fourth girder from the upstream side of the bridge has failed and is no longer there (Photos 3). The bottoms of the timber girders bearing on the pier and mauka abutment and the tops of the girders where the deck planks bear on them are severely decayed. Probes with a metal rod were able to penetrate up to 6 inches into the timber girders.

The eight 6 x 12 timber girders in the makai span are in fair condition (Photos 2). Some degree of decay is occurring typically at the bottoms of the timber girders where they bear on the pier and makai abutment and the tops of the girders where the deck planks bear on them. Probes with a metal rod were able to penetrate up to 1 inch into some of the timber girders.

4. Timber Framed Pier:
 - a. Pier Cap Beam: The double 6 X 12 pier cap beams is in fair condition. The upstream end however is the severely decayed and we suspect it is

progressing down the length of the timber cap beams (Photos 9).

- b. Pier Columns: The timber pier columns are in fair to poor condition (Photos 5, 6, 10 & 11). The decayed 6 x 12 members reported in the previous September 12, 2011 assessment has been augmented with additional 6 x 12 timber members at all three pier columns. The timber plates, upon which the columns bear, are severely decayed (Photos 11 & 12).
- c. Pier Braces: The severely decayed 4 x 12 diagonal timber brace members reported in the previous September 12, 2011 assessment has been replaced with a 4 x 12 timber members (Photos 5). The braces are in satisfactory condition.

The timber pier does not appear to have sufficient capacity to resist seismic forces.

- d. Pier Wall: The concrete pier wall is in fair to poor condition. Honeycombing and heavy scaling has resulted in section loss (Photos 6). We suspect the concrete pier base wall is unreinforced concrete.

- 5. Abutments: The CRM abutments are in fair condition.
- 6. Signage: There is a weight limit sign stating a 3000 pound per axle/5000 pound gross vehicle weight limit at the mauka approach to the bridge (Photos 13). However, a temporary concrete barricade across the road just pass the weight limit sign has been installed along with a sign stating road closed (Photos 1 & 14). Further up the road from the bridge near the Nahiku Church a sign across the road states that the road is closed, local traffic only and that the bridge is closed indefinitely due to hazardous conditions (Photos 15).

CONCLUSIONS AND RECOMENDATIONS

- 1. Based on the existing condition of the bridge at the time of this assessment, the bridge closed signage due to hazardous condition is appropriate. The existing timber bridge does not sufficient capacity to support vehicle loads. The bridge can be continued to be used for only light pedestrian traffic.
- 2. Assuming the deteriorated timber members the bridge are repaired and restored to its original as-built condition, the gross vehicle weight limit could be increased to a maximum of 6,000 lbs., or a maximum axle load of 4,000 lbs., whichever is smaller. The repairs should also include seismic retrofit of the timber bridge to meet current code.
- 3. Due to the deteriorated condition of the timber members, consideration should be given for a bridge replacement instead of repairing the existing bridge.
- 4. The effects of scour and stream hydraulics was not addressed in this letter report.

No warranty is expressed or implied by this letter report.

If there are any questions or comments, please feel free to contact us.

Sincerely,

NAGAMINE OKAWA ENGINEEERS INC..

Dwight M. Okawa, S.E.
Vice President

Attachments: Photos

PHOTOGRAPHS



PHOTO 1 4x12 DECK PLANKS AND METAL GUARDRAILS ON BRIDGE



PHOTO 2 MAKAI SPAN

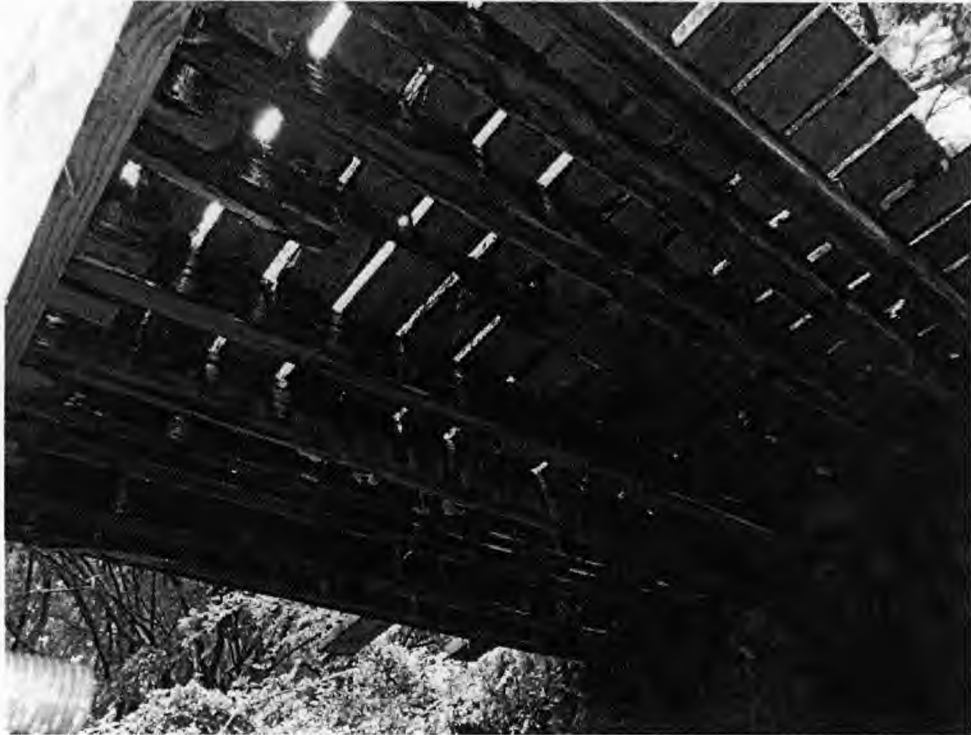


PHOTO 3 MAUKA SPAN



PHOTO 4 6x12 TIMBER GIRDERS LAPPED OVER INTERMEDIATE PIER



PHOTO 5 TIMBER PIER BETWEEN THE MAUKA AND MAKAI SPANS



PHOTO 6 CONCRETE PIER WALL

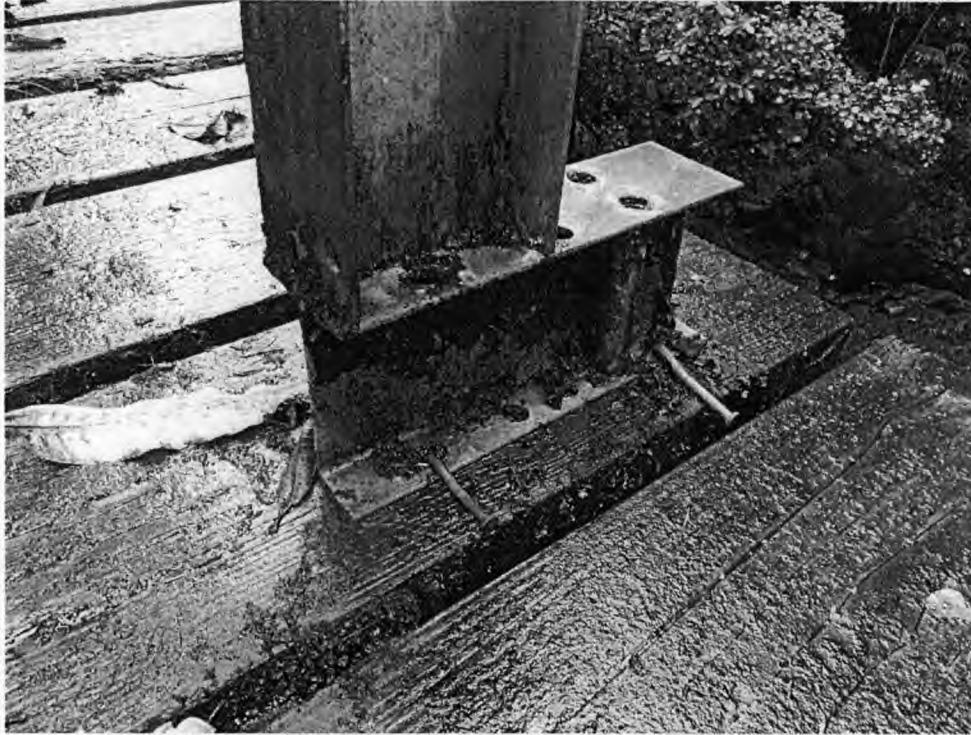


PHOTO 7 **BASE OF GUARDRAIL POST NAILED TO 4x12 DECK PLANK**



PHOTO 8 **CLOSE-UP VIEW OF 4x12 TIMBER DECK PLANKS**



PHOTO 9 SEVERE DECAY AT UPSTREAM END OF TIMBER PIER CAP BEAM



PHOTO 10 DECAYED UPSTREAM TIMBER PIER COLUMN



PHOTO 11 **DECAYED TIMBER COLUMN AND BEARING PLATE AT BASE OF CENTER
TIMBER PIER COLUMN**



PHOTO 12 **DECAYED TIMBER BEARING PLATE AT BASE OF UPSTREAM TIMBER PIER
COLUMN**

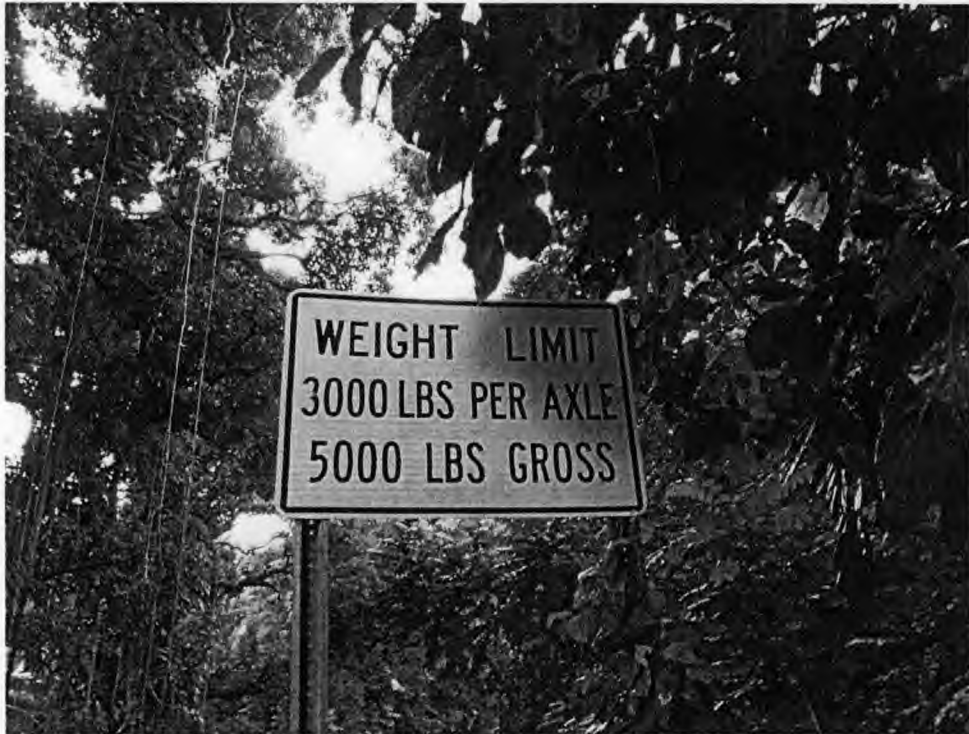


PHOTO 13 WEIGHT LIMIT SIGN AT APPROACH TO BRIDGE



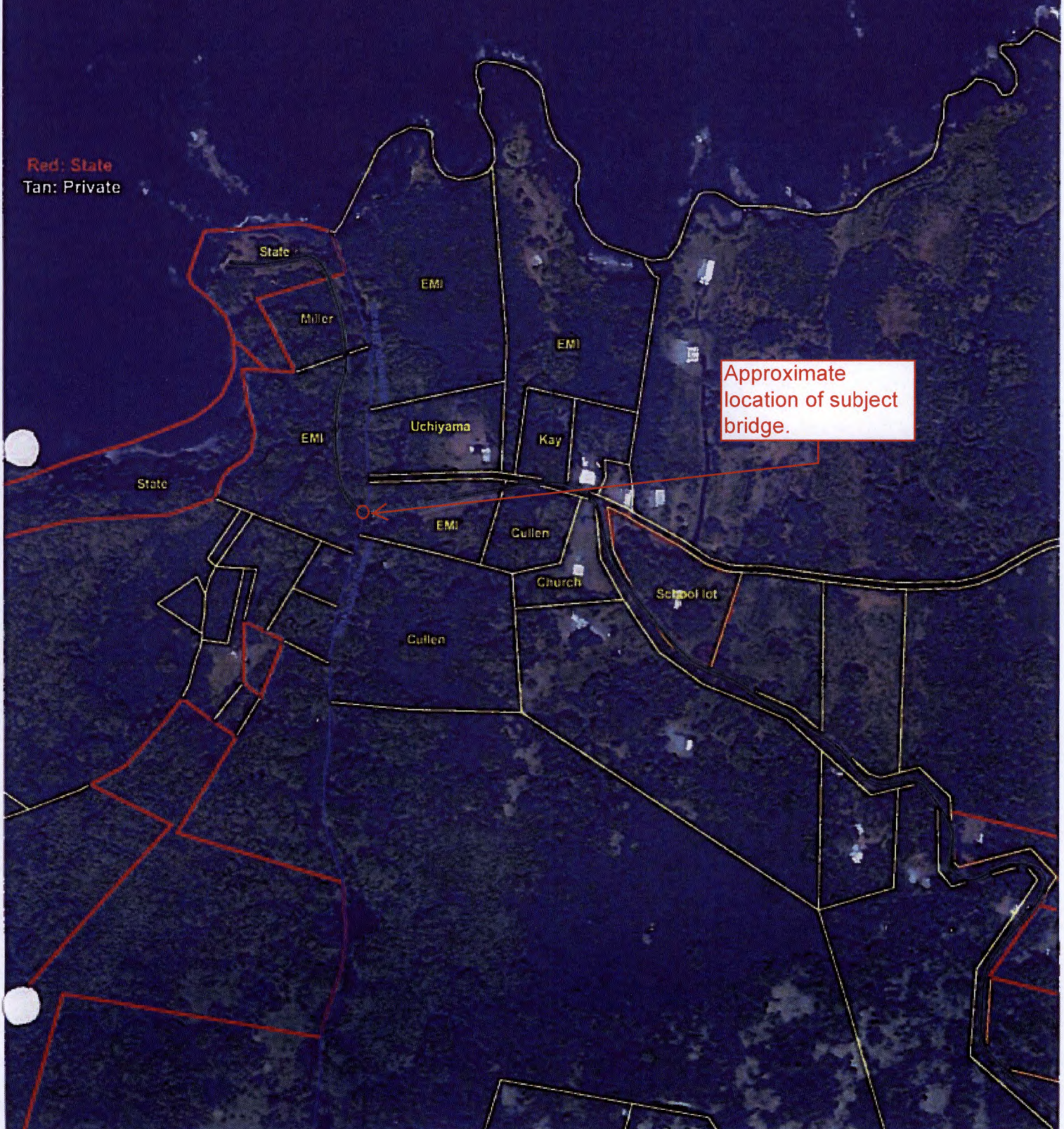
PHOTO 14 BARRICADE AT MAUKA END OF BRIDGE LOOKING MAKAI



PHOTO 15 ROAD CLOSED SIGN ON LOWER NAHIKU ROAD NEAR NAHIKU CHURCH

Map provided by Larry Pacheco (State of Hawaii, Department of Land and Natural Resources) on September 25, 2014.

Red: State
Tan: Private



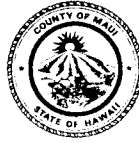
Approximate location of subject bridge.

Council Chair
Mike White

Vice-Chair
Don S. Guzman

Presiding Officer Pro Tempore
Michael P. Victorino

Councilmembers
Gladys C. Baisa
Robert Carroll
Elle Cochran
Don Couch
Stacy Crivello
Riki Hokama



Director of Council Services
David M. Raatz, Jr., Esq.

COUNTY COUNCIL

COUNTY OF MAUI
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793
www.MauiCounty.us

RUSH

September 22, 2016

DIRECTOR
DEPUTY DIR
FINANCIAL
PERSONNEL
DEPT
ENGR
HAWAII
STAFF

Routing slip grid with handwritten initials and checkmarks.

Mr. David Goode, Director
Department of Public Works
County of Maui
Wailuku, Hawaii 96793

Dear Mr. Goode:

SUBJECT: **LOWER NAHIKU BRIDGE HEALTH AND SAFETY CONCERNS (NAHIKU)** (IEM-10)

May I please request your assistance with providing the following information, relating to the Lower Nahiku Bridge:

1. A copy of the title report for the land.
2. A copy of the latest structural assessment completed, to date.
3. A copy of the latest inspection report completed, to date.
4. Detailed list of all maintenance work performed on the bridge by the County, to date, including cost. Include how the County paid for the maintenance work performed.
5. A map that clearly outlines the location of the bridge with respect to the surrounding properties, including ownership of the properties.
6. The Department's recommendation for repair or replacement of the bridge, including estimates and timeline for repair or replacement. If replacement of the bridge is recommended, also include costs for removal and permitting.
7. If the County is willing to pay for repair or replacement costs, identify the funds that could be used, including whether Federal funding is available.

May I further request you transmit your written response **no later than October 5, 2016**. To ensure efficient processing, please include the relevant Committee item number in the subject line of your response.

September 22, 2016
Page 2

Should you have any questions, please contact me or the Committee staff (Shelly Espeleta at ext. 7134, or Rayna Yap at ext. 8007).

Sincerely,

A handwritten signature in cursive script that reads "Elle Cochran".

ELLE COCHRAN, Chair
Infrastructure and Environmental Management
Committee

iem:ltr:010apw01:ske

cc: Mayor Alan M. Arakawa