ALAN M. ARAKAWA
Mayor

GILBERT S. COLOMA-AGARAN
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

Telephone: (808) 270-7745
Fax: (808) 270-7975

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND ENVIRONMENTAL MANAGEMENT
ENGINEERING DIVISION
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

TRACY TAKAMINE, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

JOHN D. HARDER
Solid Waste Division

February 20, 2003

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
Department of Health
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

SUBJECT: FINAL ENVIRONMENTAL ASSESSMENT FOR WAIOHONU BRIDGE REPLACEMENT, HANA, MAUI; JOB 01-13

In accordance with the provisions of the Chapter 343, Hawaii Revised Statutes and Title 11, Chapter 200 of the Administrative Rules of the State Department of Health, a Final Environmental Assessment (FEA) has been prepared for the subject project.

As the approving agency, the County of Maui Department of Public Works and Environmental Management has determined that there will be no significant impacts as a result of the proposed action. We respectfully request that the Finding of No Significant Impact (FONSI) determination be published in the March 8, 2003 edition of the OEQC Environmental Notice.

Enclosed are one (1) copy of the OEQC Publication form and four (4) copies of the Final EA. The project summary will be e-mailed to the OEQC by the applicant's consultant. Thank you for your cooperation. If additional clarification is required, please contact Joe Krueger, Project Engineer at 270-7745.

Sincerely,

Gilbert Coloma-Agaran
Department of Public Works and
Environmental Management

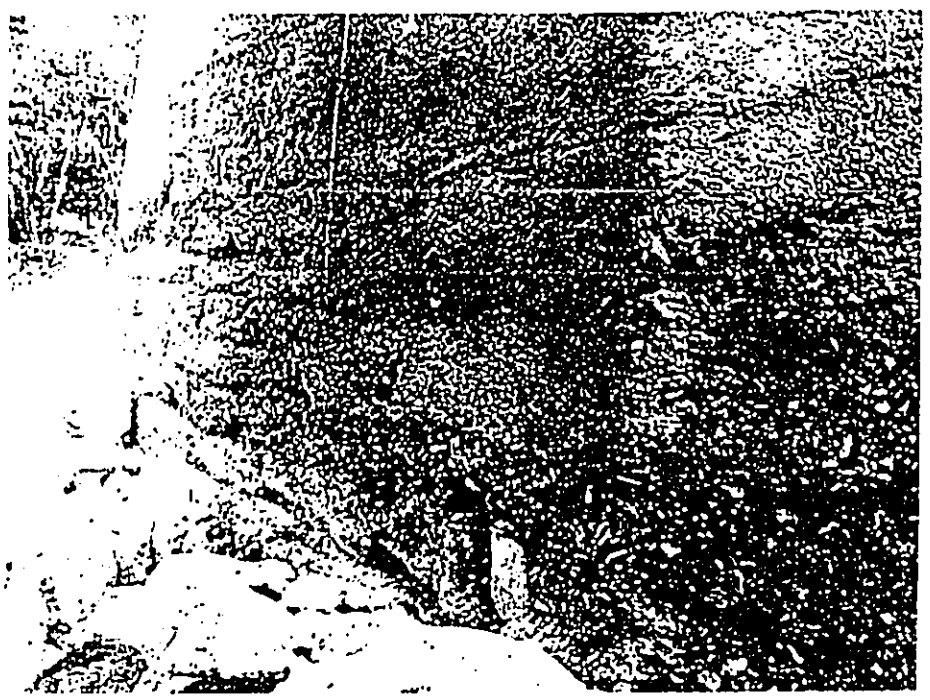
GCA:yp(ED03- 180)
Enclosures
cc: Joe Krueger, Department of Public Works and Environmental Managment
Mike Ishikawa, Sato & Associates, Inc.
S:\ENGVALL\Joe\Waiohonu-06

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

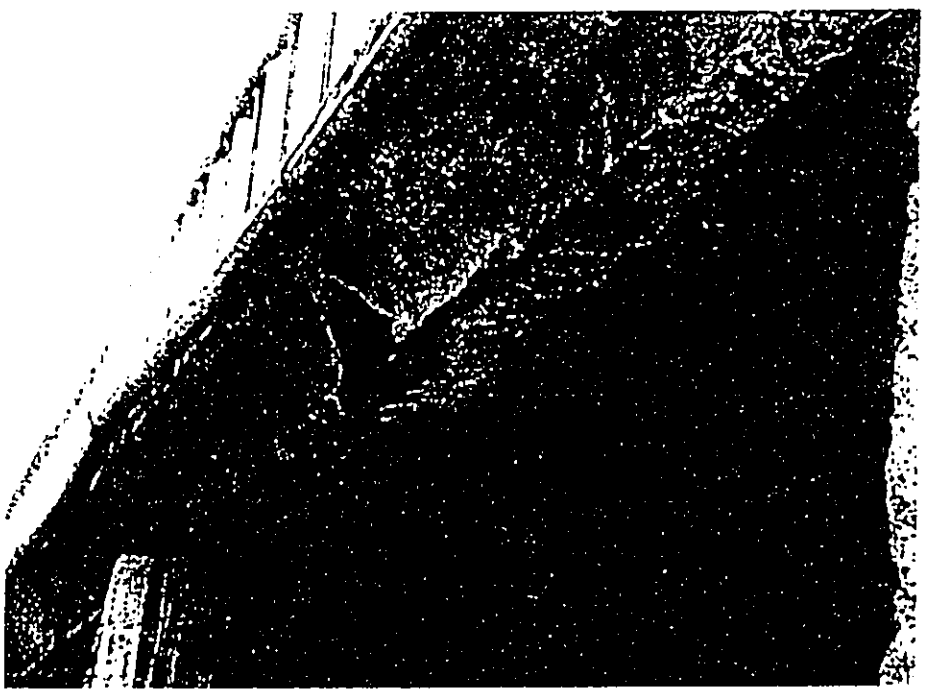
Span 1, soffit between G3 - G4, water stains, light efflorescence.

Pier #1 collision damage, upstream face, heavy scaling.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

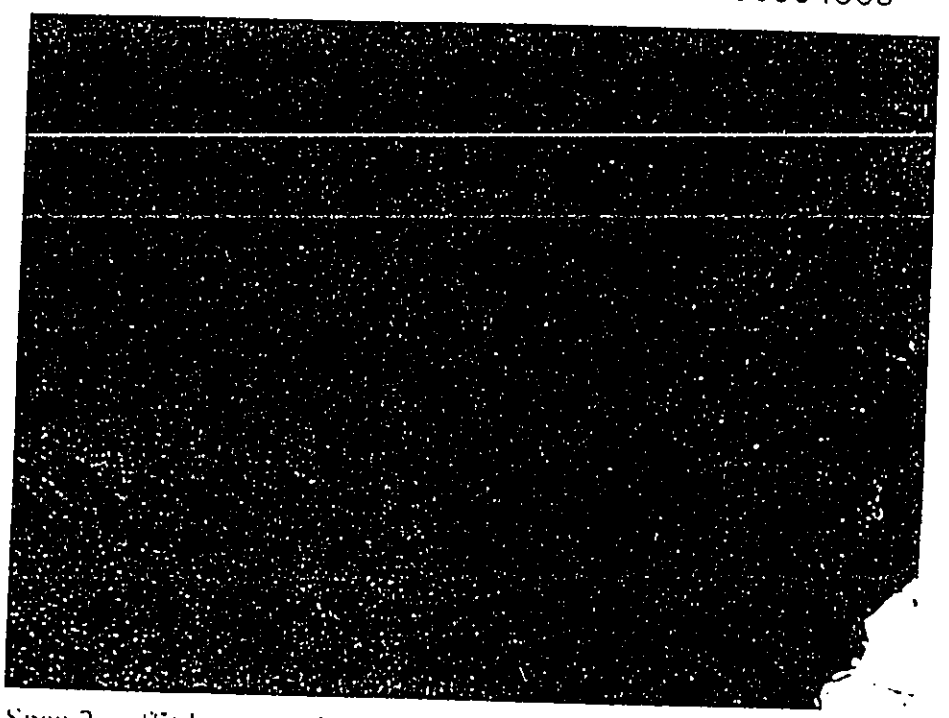


Span #2. side of pier #1, collision damage, heavy scaling.



Span 2. Girder 1, typical to all spans, spalls, exposed rusted reinforcing steel with complete section loss of bottom reinforcing bars and stirrups. Water stains, mold mildew.

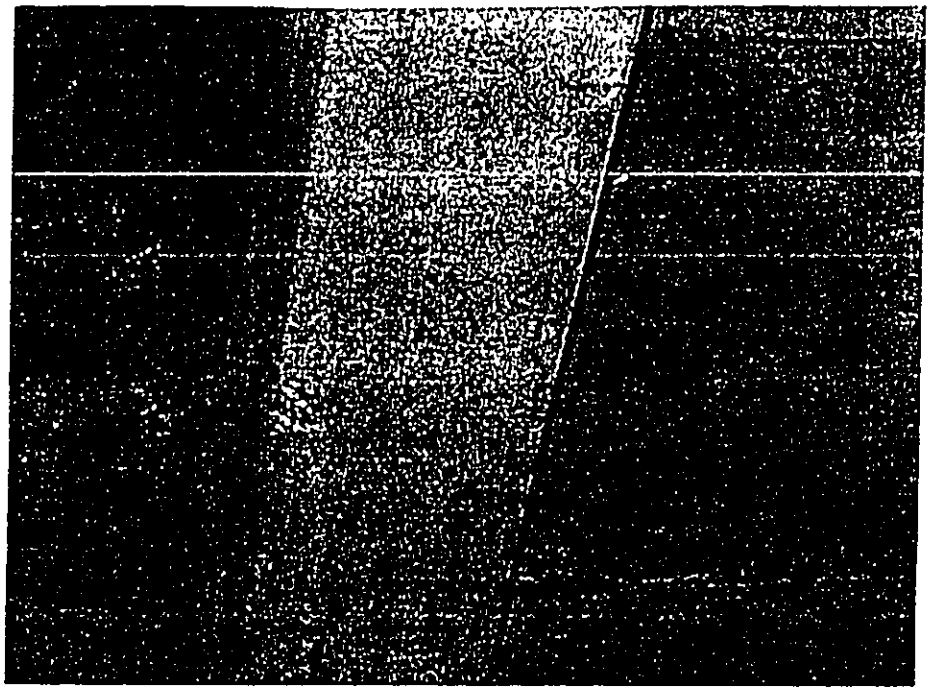
County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803



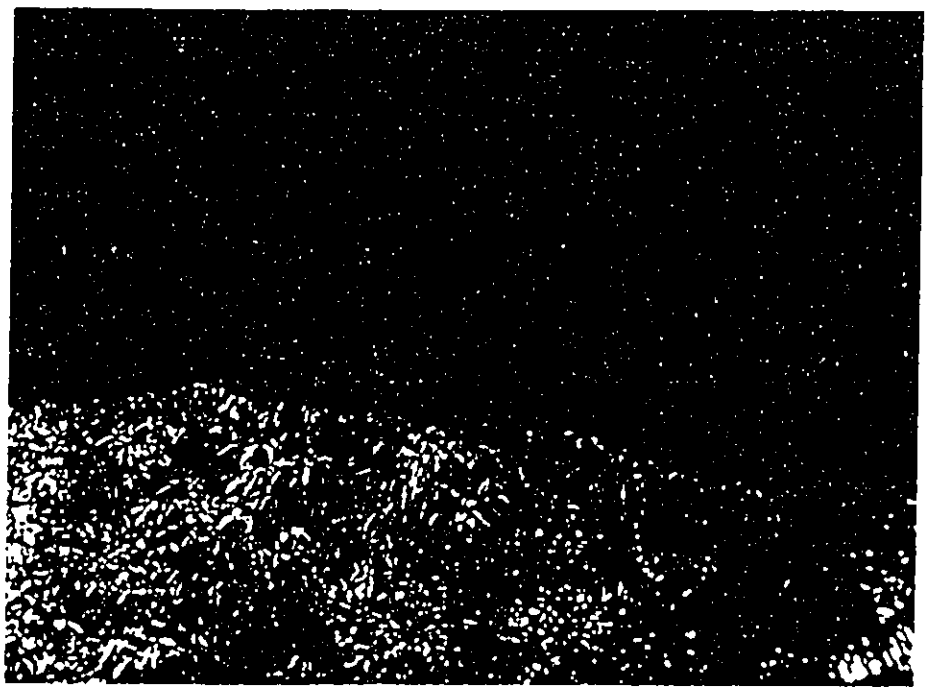
Span 2, soffit between G1 / G2, water stains, exposed rusted reinforcing steel with section loss.

Span 2, Girder 2, longitudinal crack along bottom of girder 1/4 - 1/2 in. wide x 7 ft. long. Span 2, soffit between G2 / G3, spalling eminent, water stains, efflorescence.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

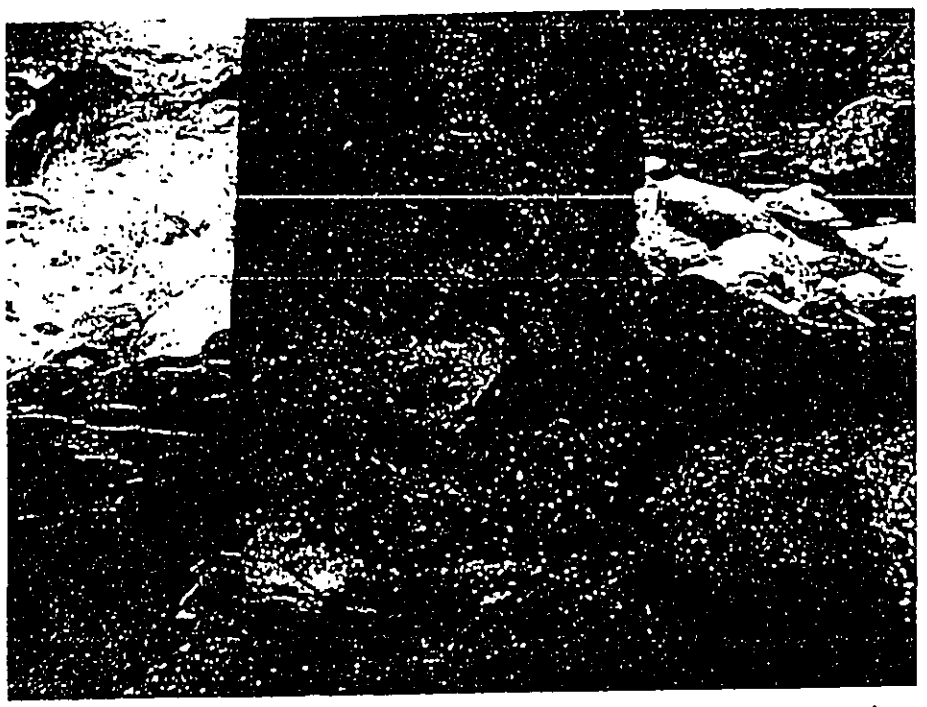


Span 2, Girder 3, longitudinal cracks along bottom face of G2, 1/8 - 1/4 in. wide 3 ft. long. Span 2, soffit between G3 / G4 water stains, efflorescence.

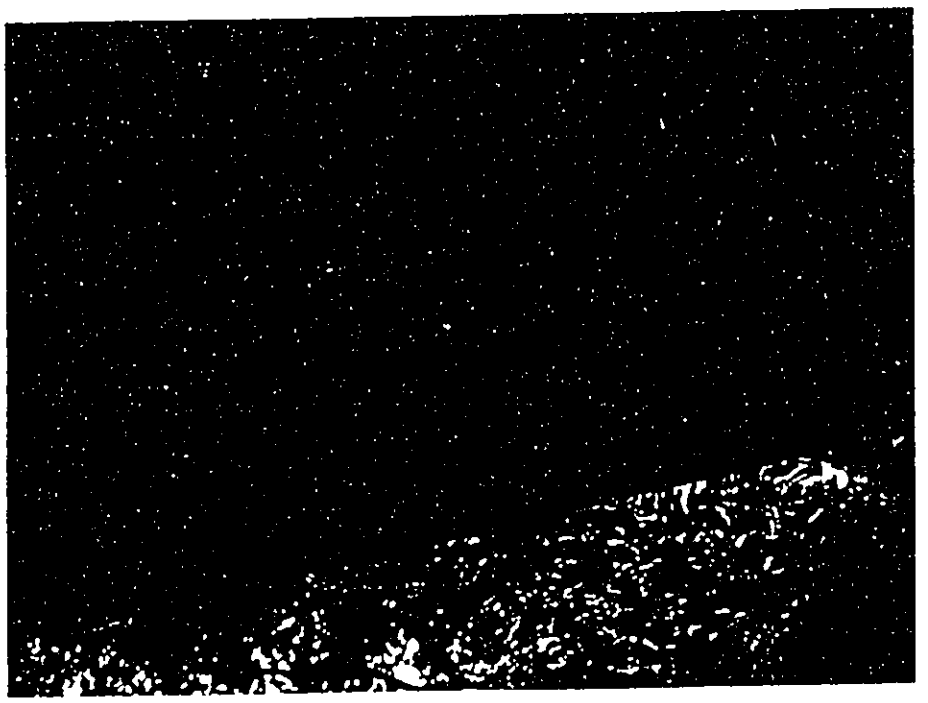


Span 2, Girder 4, typical to all spans, spalls, exposed rusted reinforcing steel with major section loss to bottom bars, complete section loss of stirrups.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

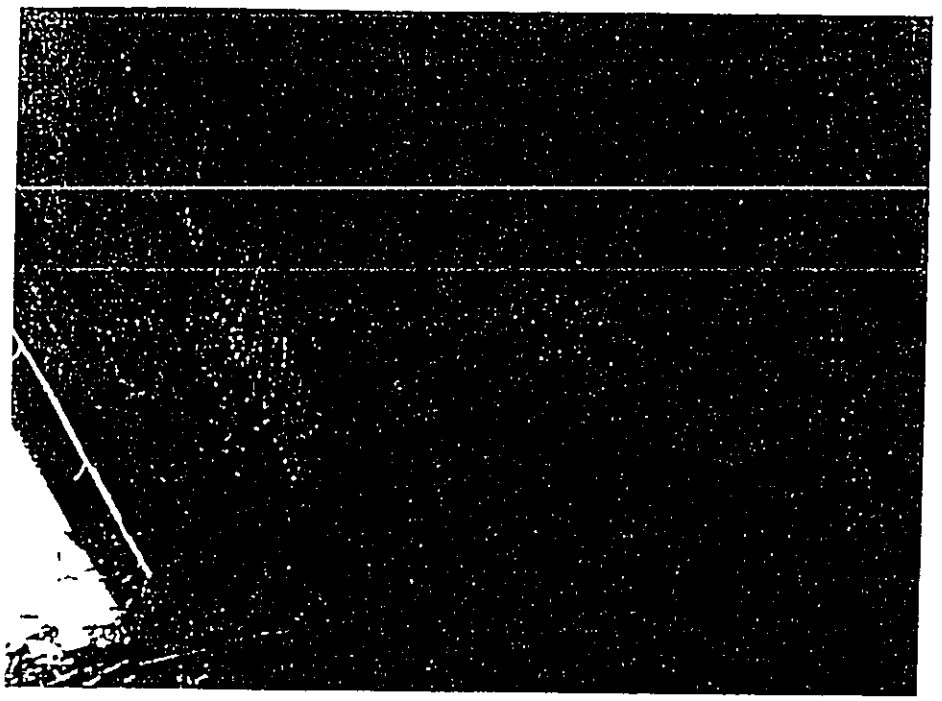


Span 2, Pier 2, upstream nose of pier, collision damage, heavy scaling.

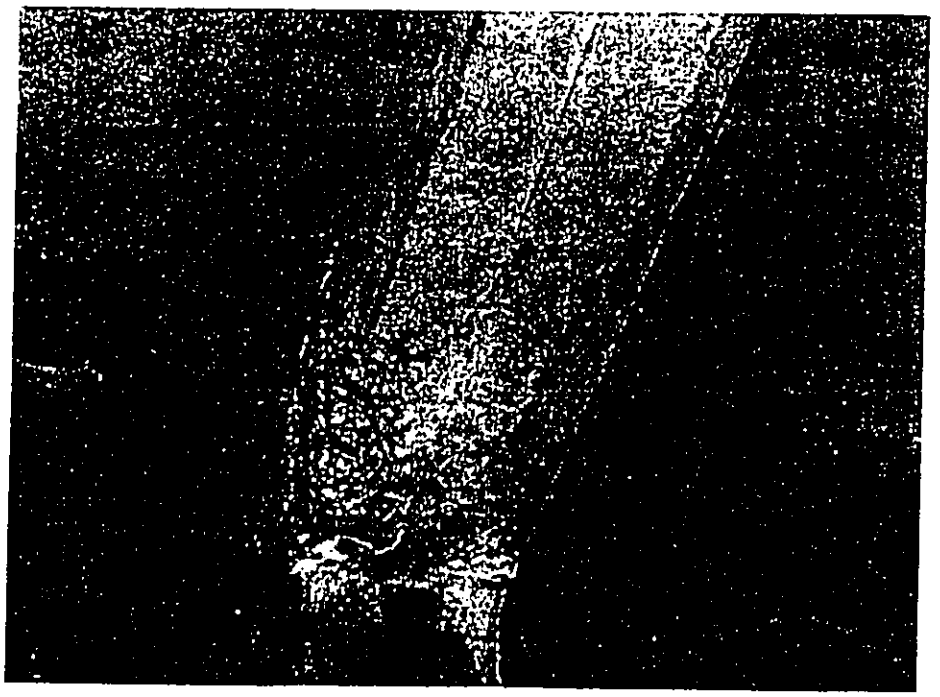


Span 3, Girder 1, spall, exposed rusted reinforcing steel, section loss.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

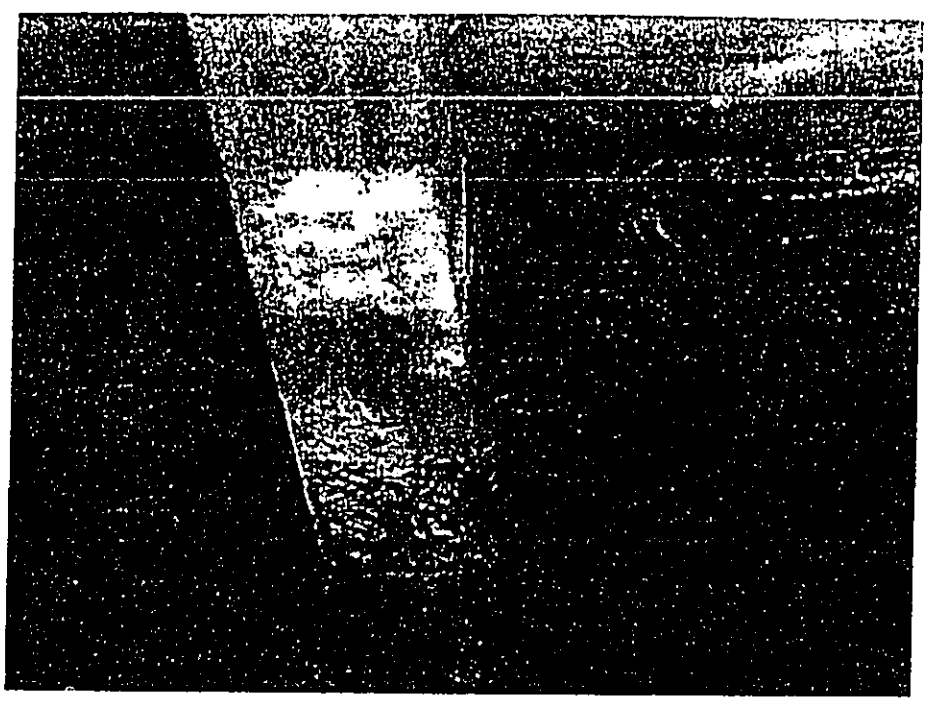


Span 3, Girder 1, spalls typical to entire girder all spans, spalls on inside face exposed rusted reinforcing steel, longitudinal cracking along entire length hairline to 1/4 in. wide, spalling eminent .

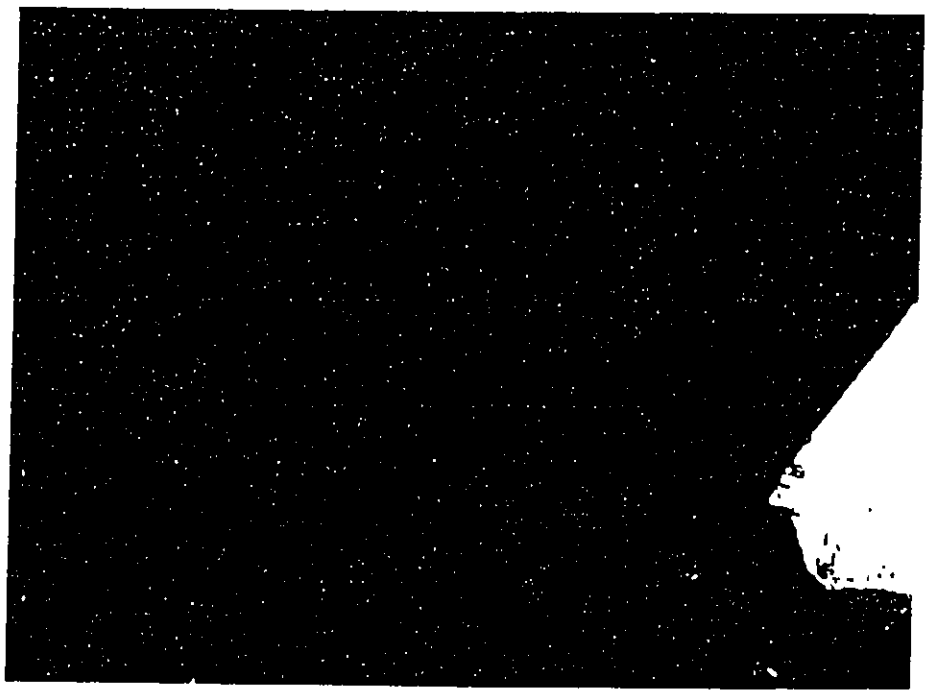


Span 3, Girder 2, Pier 3, spall on G2 with exposed rusted reinforcing steel with section loss, soffit between G1 / G2 & G2 / G3 above Pier 3, water stains, rust stains, mold, mildew, efflorescence, spalling eminent.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803



Span 3, Girder 3, spalls, exposed rusted reinforcing steel, cracking along entire length of bottom face.



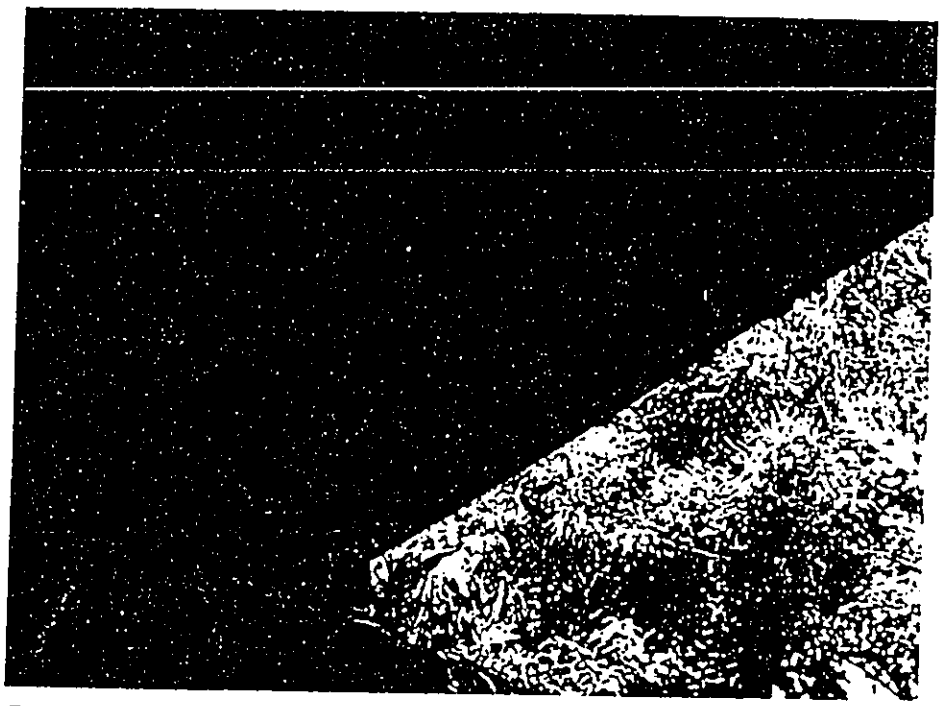
Span 3, Girder 3, exposed rusted reinforcing steel downstream face above Pier 3, longitudinal cracking over 80% of length.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

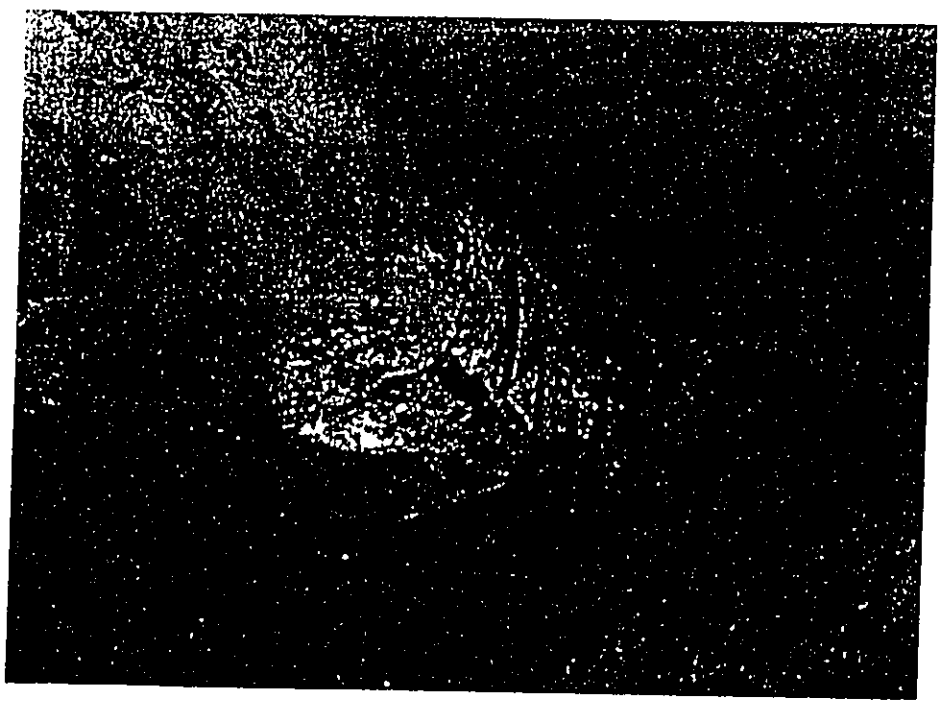
Span 3, Girder 4, spalls exposed rusted reinforcing steel with section loss, soffit between G3 / G4 water stains, effloresecence.

Span 4. Pier 3, wet, water stains, leaking from deck.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

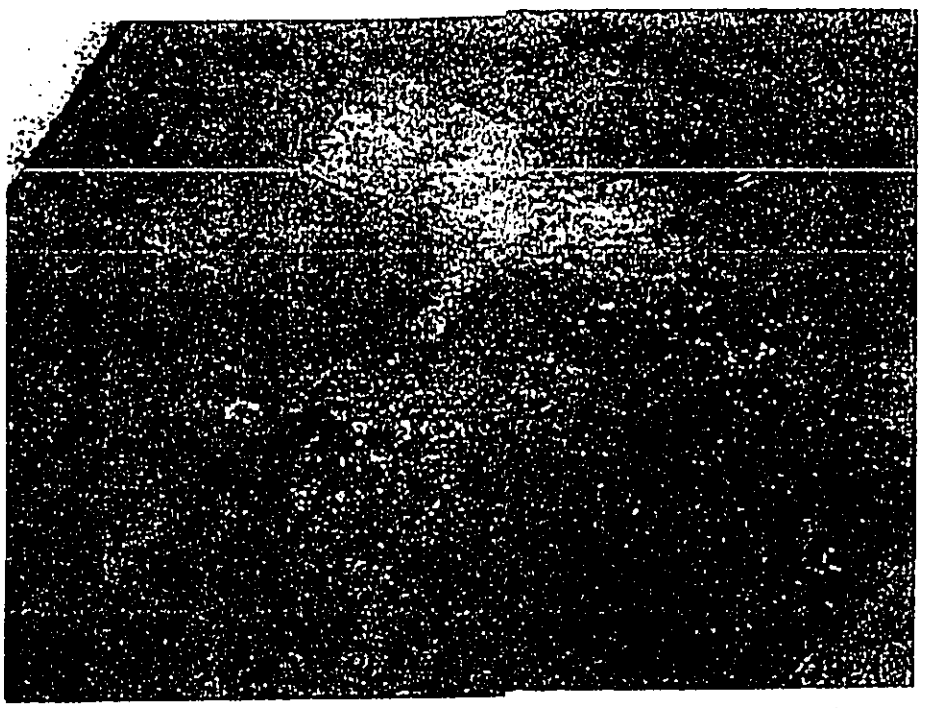


Span 4, Girder 1, water stains, effloresecence, exposed rusted reinforcing steel with minor section loss, longitudinal crack 1/8 in. wide x 10 ft. long.

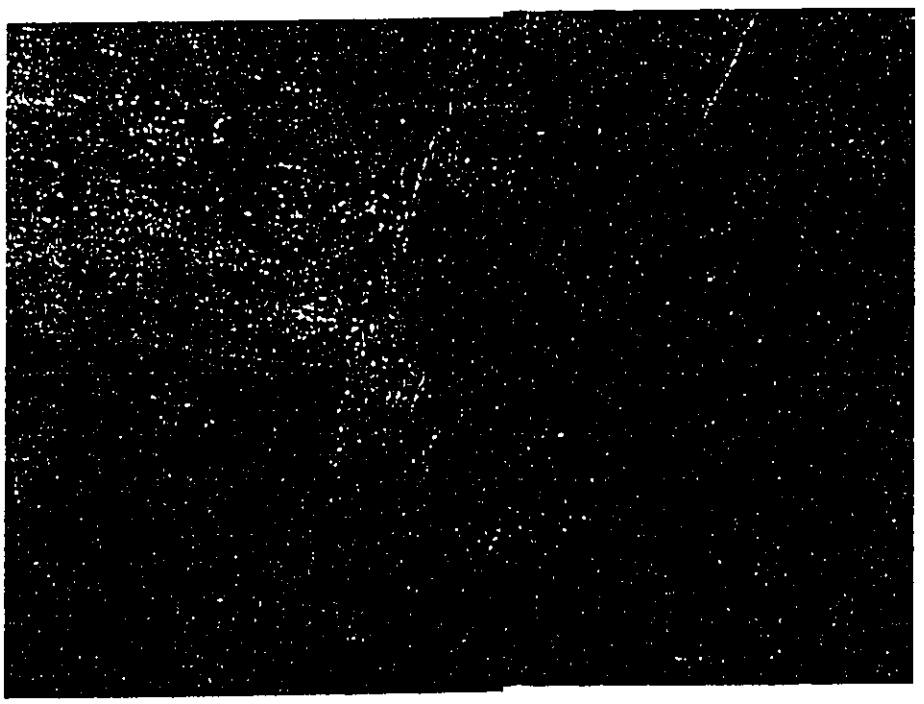


Span 4, Girder 2, above Pier 3, spalls exposed rusted reinforcing steel with section loss.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

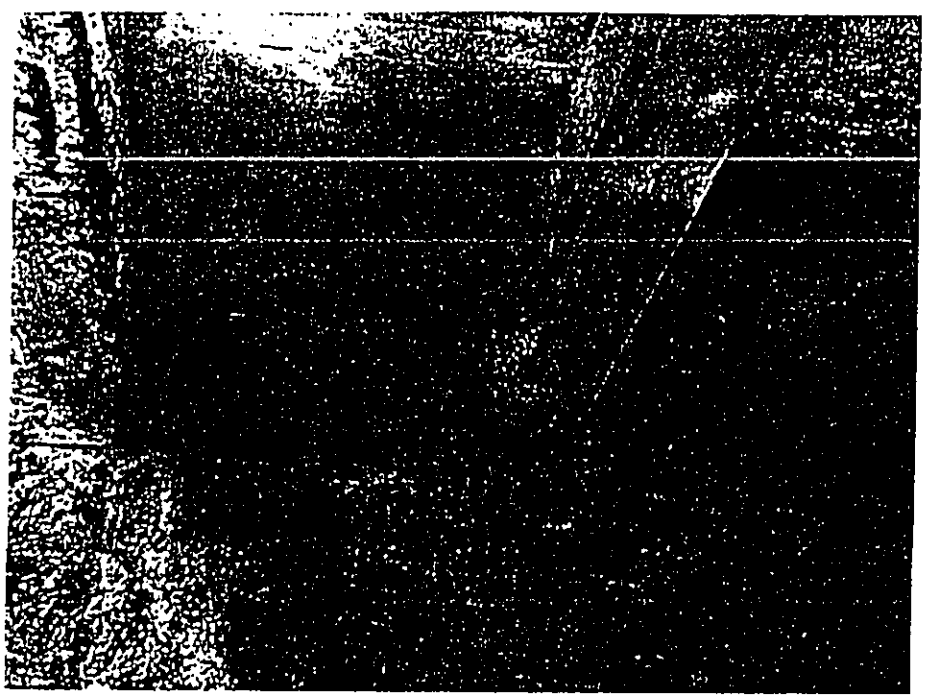


Span 4, soffit between G2 / G3, honeycomb (typical) water stains above Pier 3.

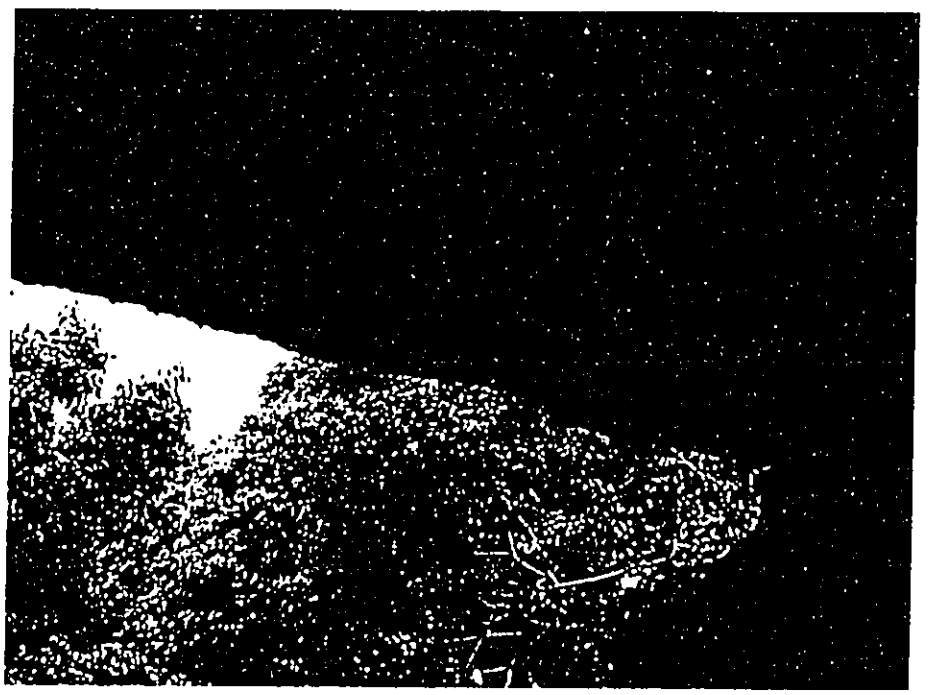


Span 4, Girder 3, spalls, exposed rusted reinforcing steel, crack 1/8 in. wide x 6 ft. long.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

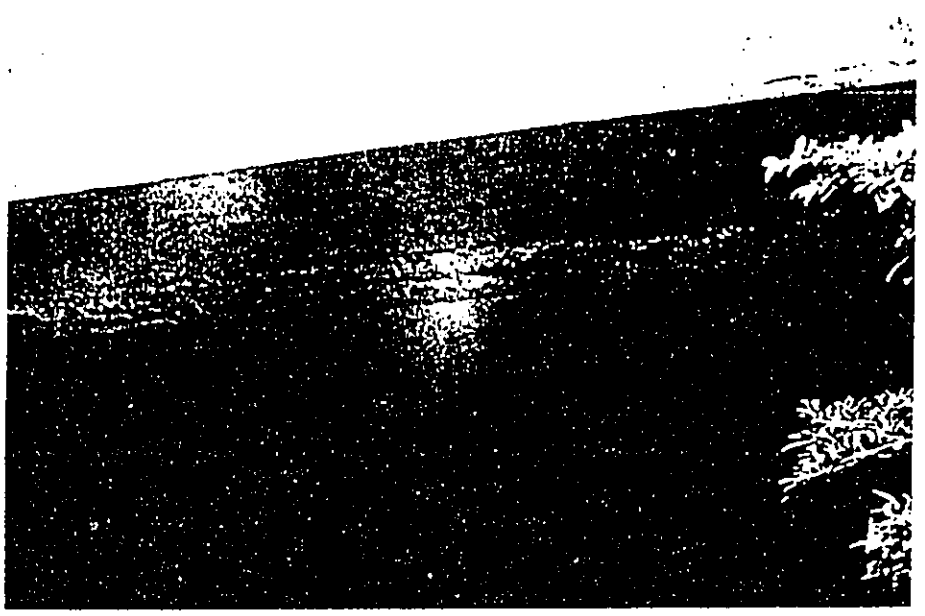


Span 4, soffit between G3 / G4 water stains above Pier 3.



Span 4, Girder 4, Spalls exposed rusted reinforcing steel with section loss, typical over entire length.

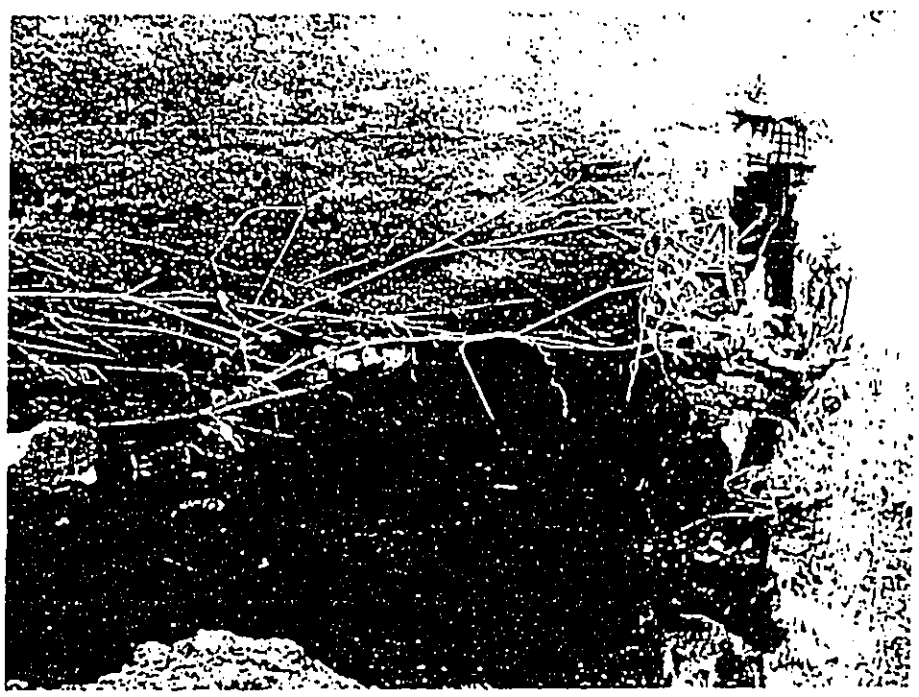
County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803



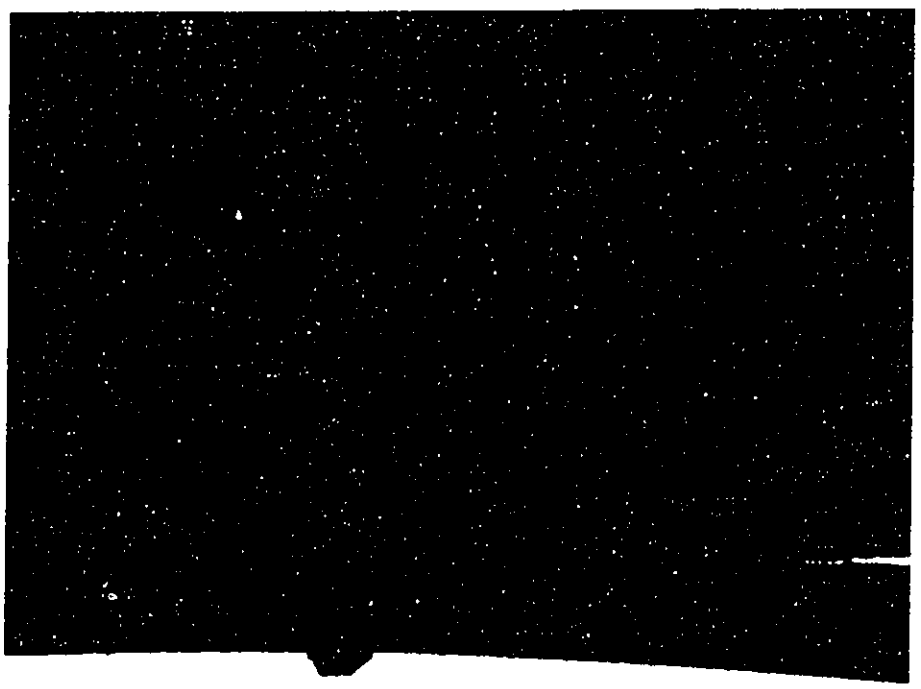
Span 4, Girder 4, downstream face, spalls exposed rusted reinforcing steel with major section loss over entire length of girder.

Pier 4, downstream face, vegetation.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

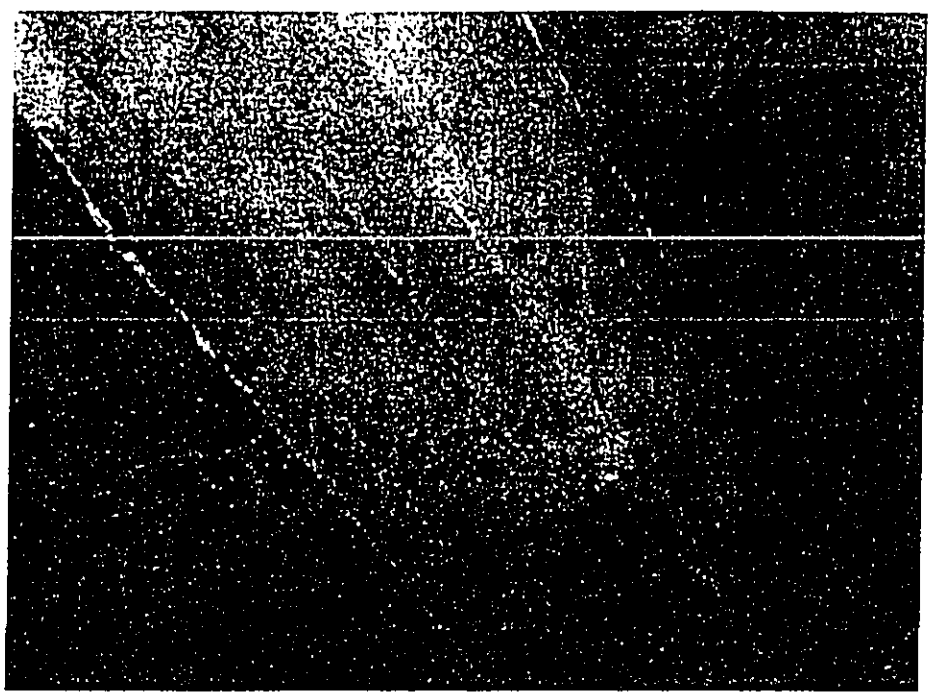


Span 5, Pier 4, undermine 12 ft. L x 2 ft. W x 1.5 ft. H.

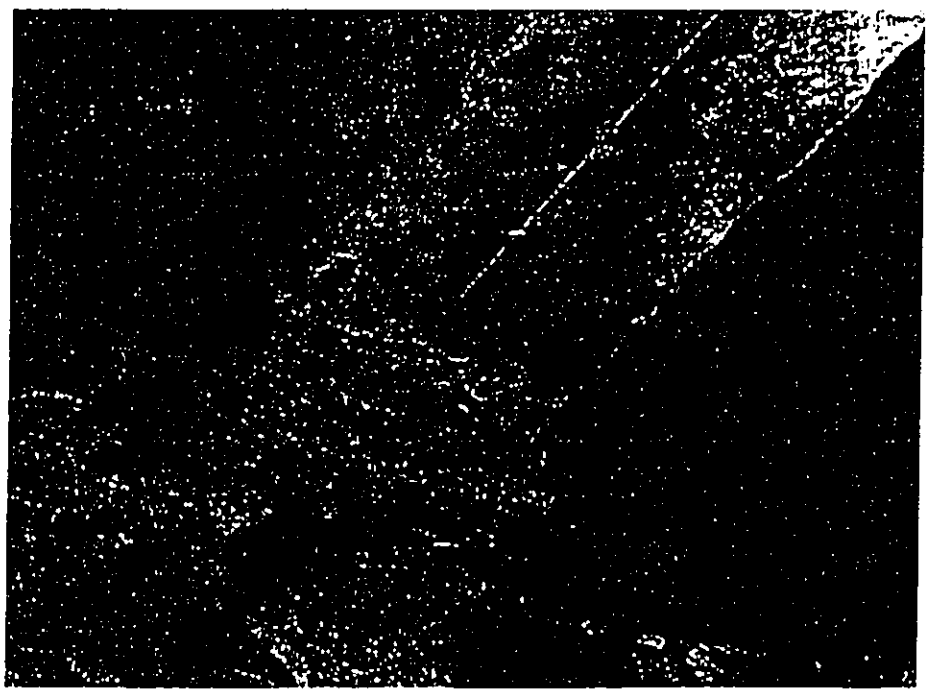


Span 5, Girder 1, water stains, spalls exposed rusted reinforcing steel and stirrups.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

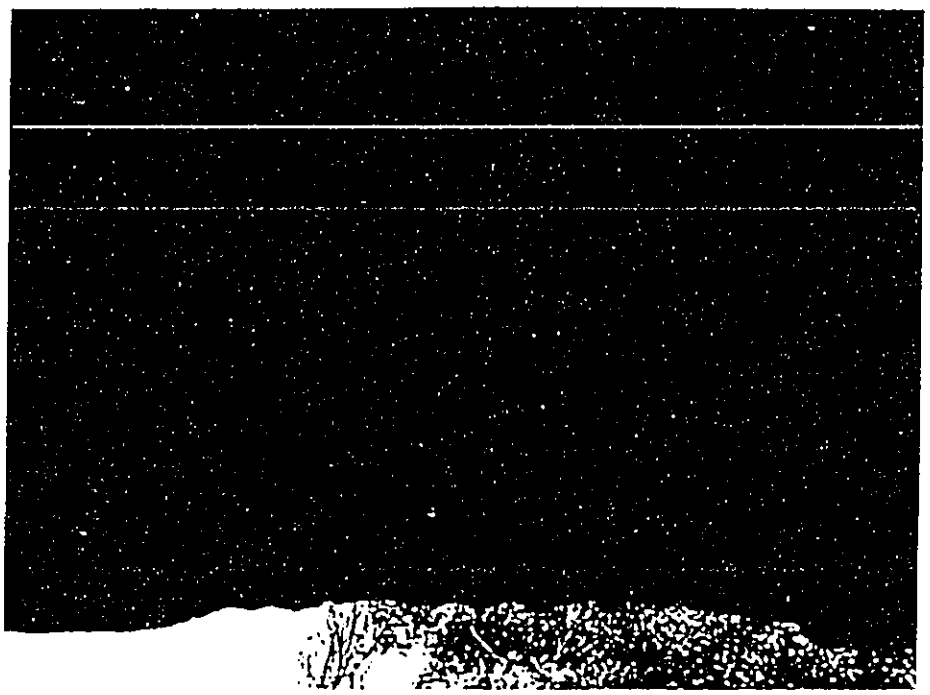


Span 5, Girder 2, Hairline crack 3 ft. long.



Abutment 2, Girder 3, spall exposed rusted reinforcing steel.

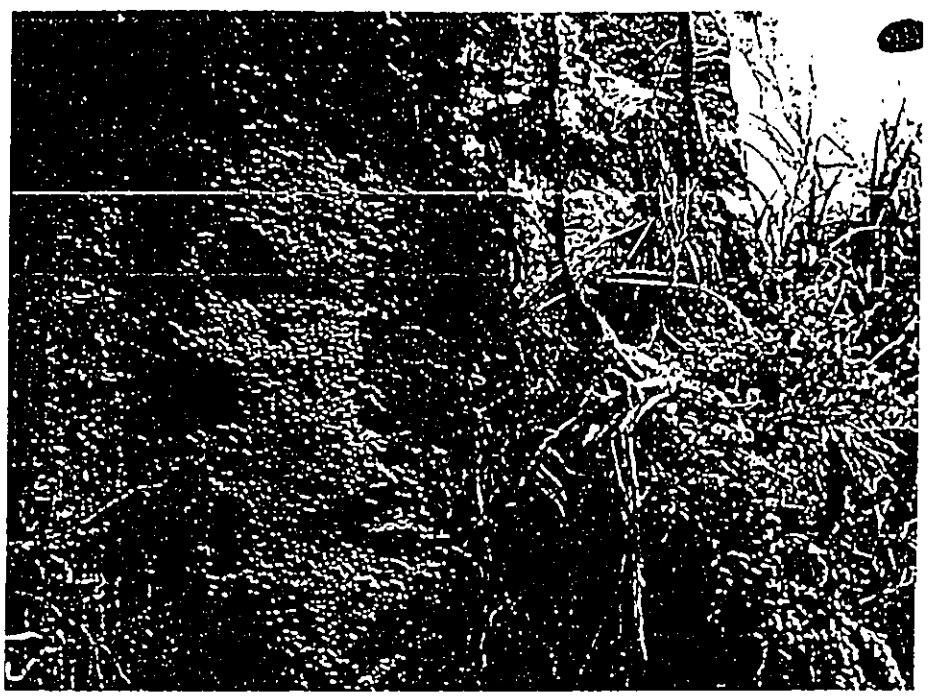
County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803



Span 5, Girder 4, spalls exposed rusted reinforcing steel, typical to entire length.

Abutment 2, Hana end, minor undermine, 6 in. scour to solid rock and cobble.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803



Abutment 2, Hana end, vertical crack.

Abutment 2, Hana end, undermine.

APPENDIX C

Soils Investigation
Waiohonu Bridge Replacement

Ernest K. Hirata & Associates, Inc.

August 2002

SOILS INVESTIGATION
WAIOHONU BRIDGE REPLACEMENT
HANA HIGHWAY
HANA, MAUI, HAWAII

for

SATO & ASSOCIATES, INC.

ERNEST K. HIRATA & ASSOCIATES, INC.
W.O. 01-3500
May 2, 2002

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

ERNEST K. HIRATA, P.E.
PAUL S. MORIMOTO, P.E.
DAVID M. KITAMURA, P.E.
JUNG K. KIM, P.E.
CON C. TRUONG, P.E.
ERIC H. TAMASHIRO, P.E.

99-1433 Koaha Place • Aiea, Hawaii 96701-3279
Phone: (808) 486-0787 • Fax: (808) 486-0870
E-mail: eha@hawaii.rr.com

May 2, 2002
W.O. 01-3500

Mr. Loren Lau
Sato & Associates, Inc.
2046 South King Street
Honolulu, Hawaii 96826

Dear Mr. Lau:

Our report, "Soils Investigation, Waiohonu Bridge Replacement, Hana Highway, Hana, Maui, Hawaii," dated May 2, 2002, our Work Order 01-3500 is enclosed. This investigation was conducted in general conformance with the scope of work presented in our proposal dated April 11, 2001.

Medium hard to hard basalt was encountered at the surface in our borings drilled within the stream area and at depths of about 15 to 16 feet in borings drilled at the abutment locations. The basalt strata extended down to the maximum depths drilled. However, numerous clinker seams/pockets were encountered within the basalt strata. The clinker seams varied from only a few inches to several feet in thickness. As a result, a probing and grouting program is recommended for all new foundations.

Spread footings founded on the medium hard to hard basalt may be used for support of the proposed replacement bridge. Foundations bearing directly on the basalt may be designed for a bearing value of 18,000 and 30,000 psf under the Strength Limit State and Extreme Event Limit States, respectively.

Additional geotechnical recommendations are presented in this report. We appreciate this opportunity to be of service. Should you have any questions concerning this report, please feel free to call on us.

Very truly yours,

ERNEST K. HIRATA & ASSOCIATES, INC.

for Paul S. Morimoto
Ernest K. Hirata President

EKH:CCT:ph

TABLE OF CONTENTS

APPENDIX

SOILS INVESTIGATION
WAIOHONU BRIDGE REPLACEMENT
HANA HIGHWAY
HANA, MAUI, HAWAII

INTRODUCTION

This report presents the results of our soils investigation performed for the proposed replacement of Waiohonu Bridge on Hana Highway in Hana, Maui. Our work scope for this study included the following:

- A visual reconnaissance of the site and its vicinity to observe existing conditions which may affect the project. The general location of the project site is shown on the enclosed Location Map, Plate 1.

- A review of available in-house soils information pertinent to the site and the proposed project.

- Drilling and sampling 4 exploratory borings to depths ranging from about 17 to 47 feet. The soils encountered are described on the Boring Logs, Plates B1 through B6. The approximate exploratory boring locations are shown on the enclosed Boring Location Plan, Plate 2.

- Laboratory testing of selected soil samples. Testing procedures are presented in the Description of Laboratory Testing, Page 1 in the Appendix, and test results are shown in the Description of Laboratory Testing, on the Boring Logs, and on Plates C, D, and E.

- Engineering analyses of the field and laboratory data.

- Preparation of this report presenting geotechnical recommendations for design of the new bridge and flexible pavement for the approach areas.

PROJECT CONSIDERATIONS

The proposed replacement bridge will be located at the site of the existing bridge. The new bridge is expected to be about 16 feet wide and about 120 feet long, with either one or two intermediate piers in the stream area. Foundation loads were not available at the time of this report, however we understand that the new bridge will be designed to accommodate HS 20 truck loading.

We expect that the proposed finish grades will generally match the existing grades.

SITE CONDITIONS

Waiohonu Bridge is a single lane bridge located along Hana Highway, approximately 450 feet south of the milepost 48. The bridge spans over Waiohonu Stream.

The existing bridge is a concrete structure, approximately 16 feet wide and 100 feet long with 4 intermediate piers. Concrete rock walls are used for the protection of the abutments and adjacent slopes. Waiohonu Stream flows approximately 15 feet below the bridge deck. Rock outcrops were observed along the stream bottom.

FIELD EXPLORATION

The site was explored between November 28, 2001 and April 25, 2002, by drilling a total of 4 exploratory test borings using either a truck-mounted Mobile B40-L12 drill rig or portable Concore drilling equipment. One boring was drilled behind each of the existing abutments and two borings were drilled in the streambed. The borings varied in depth from about 17 to 47 feet. Borings B3 and B4 extended to depths of about 21 and 17 feet, exceeding the standard 10 feet of rock drilling requirement recommended for exploratory test borings drilling for conventional foundations bearing on rock.

The soils were continuously logged by our field engineer and classified by visual examination in accordance with the Unified Soil Classification System. A Boring Log Legend is presented on Plate A1; the Unified Soil Classification and Rock Weathering Classification Systems are shown on Plates A2 and A3, respectively. The approximate boring locations are shown on Plate 2, and the soils encountered are logged on Plates B1 through B6.

Representative soil samples and core samples of rock were recovered from the borings for selected laboratory testing and analyses. Representative samples were obtained by driving a 3-inch O.D. split tube sampler with a 140-pound hammer from a height of 30 inches. The blow counts required for 12 inches of penetration are shown at the appropriate depths on the enclosed Boring Logs.

Core samples were obtained by drilling with an NX core barrel having an inside diameter of 2.1 inches. Recovery percentages for each core run are shown on the enclosed Boring Logs.

The rock quality designation (RQD) for each core run is also shown on the Boring Logs. This is a modified core recovery percentage which takes into account the number of fractures observed in the core samples. Only pieces of core 4 inches in length or longer, as measured along the centerline, were included in the determination of this modified core recovery percentage. Fractures caused by drilling or handling were ignored.

The following is a general correlation between RQD percentages and rock quality.

ROD (%)	Description of Rock Quality
0 - 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Reference: Tunnel Engineering Handbook, Second Edition, edited by J.O. Bickel, T.R. Kuesel, and E.H. King, 1996.

SOIL CONDITIONS

The surface soil encountered in our borings drilled at the abutment locations consisted of dark grayish brown clayey silt. The soil was in a medium stiff condition and extended to depths of about 15 and 16 feet. Numerous gravel, cobbles, and boulders were encountered within the clayey silt stratum.

Underlying the clayey silt were layers of basalt down to the maximum depths drilled. The basalt strata ranged from a moderately weathered and medium hard condition to slightly weathered and hard condition. Clinker seams/pockets were also encountered within the basalt strata. The clinker seams/pockets varied from only a few inches to several feet in thickness.

Borings drilled within the streambed encountered gray basalt from the surface down to the maximum depths drilled. The basalt was hard, but in a fractured condition. Numerous clinker seams were encountered within the basalt stratum.

Groundwater was not encountered in our borings down to the maximum depths drilled. Water flowed in Waihonu Stream whenever rain fell over higher ground.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our exploratory fieldwork, laboratory testing, and engineering analyses, conventional spread footings founded directly on the medium hard to hard basalt is recommended for support of the proposed replacement bridge.

Due to the numerous clinker seams/pockets encountered in the basalt strata, we recommend that a probing and grouting program be implemented prior to construction of the foundations. All footing excavations should be probed to depths at least twice the footing width or to a minimum depth of 10 feet, measured from the bottom of footing elevation. All probe holes should be filled with sand-cement grout.

Foundations

Spread footings founded on medium hard to hard basalt may be used to support the proposed bridge structure. Foundations may be designed for a bearing value of 18,000 pounds per square foot under Strength Limit State and 30,000 pounds per square foot under Extreme Event Limit State. A bearing value of 10,000 pounds per square foot may be used to evaluate the design of the foundations at Service Limit States.

Footings should be embedded a minimum 6 inches into the medium hard to hard basalt. The bottom of footing excavations should be thoroughly cleaned of loose material prior to placement of reinforcing steel and concrete. Footings located on, or near the top of slopes, should be embedded such that a minimum horizontal distance of 5 feet is maintained between the bottom edge of footing and slope face.

Probing and Grouting

All footing excavations should be probed with a drill or air track hammer. Probe holes should be drilled at 10 feet on centers along the pier, abutment and wing wall

footing excavations or for every 100 square feet of foundation area. The holes should be a minimum 2 inches in diameter and extend to depths at least twice the footing width or a minimum 10 feet below the bottom of footings.

All probe holes should be filled with pumped sand-cement grout consisting of approximately one part cement to three parts sand. Placement of thin wall plastic pipes in probe holes may be necessary to prevent holes from caving. Areas encountering large clinker pockets that consume large quantity of grout may require additional probe holes.

Lateral Design

Resistance to lateral loading may be provided by friction acting at the base of foundations and by passive earth pressure acting on the buried portions of foundations.

Coefficients of friction of 0.84 and 0.67 may be used with the dead load forces for the Extreme Event Limit State and Strength Limit State, respectively. Passive earth pressure for the clayey silt may be computed as an equivalent fluid having densities of 500 and 250 pounds per cubic foot for the Extreme Event Limit State and Strength Limit State. For medium hard to hard basalt, an equivalent fluid having densities of 1,250 and 625 pounds per cubic foot may be used for the Extreme Event Limit State and Strength Limit State. Unless covered by pavement or concrete slabs, the upper 12 inches of soil should not be considered in computing lateral resistance.

The following equivalent fluid pressures may be used for active earth pressure considerations:

Type of Soil	Freestanding Condition	Restrained Condition
Clayey silt and granular structural backfill	35 pcf	50 pcf
Basalt	25 pcf	40 pcf

A soil profile Type I and a site coefficient, S, of 1.0 may be used for seismic analyses. For dynamic lateral earth pressure considerations, the following values may be used with the Mononabe-Okabe formulas:

Type of Soil	Unit Weight	Friction Angle
Clayey silt and granular structural backfill	120 pcf	33°
Basalt	130 pcf	42°

To prevent buildup of hydrostatic pressures, weepholes or subdrains should be included in the design of all retaining structures. In addition, a minimum 12-inch thickness of free-draining gravel should be placed along the backside of retaining wing walls and abutment walls. The gravel should extend from the base of the wall, around subdrains or weepholes, up to within 12 inches of finish grade. Where the retaining wall backfill is open to the environment, the drainage gravel should be capped with 12 inches of relatively impervious soil, such as the onsite clayey silt. If the backfill is covered by interior or exterior concrete slabs, the gravel fill should extend to the bottom of slab cushion or base course elevation.

Foundation Settlement

Settlement of foundations founded on medium hard to hard basalt is expected to be negligible.

PAVEMENT DESIGN

Our flexible pavement design analysis for the new approach areas was based on the following parameters. A resistance value (R-value) of 5 was assumed for the subgrade material.

- ADT(2002) = 950
- ADT(2022) = 2,650
- Percent Trucks (T24) = 1%
- Design Life = 20 years

Based on the above, the following pavement sections may be used for design of the approaches. The subgrade, subbase, and base course should be compacted to a minimum 95 percent compaction as determined by AASHTO T-180 (ASTM D 1557).

Alternate #1

3.5"	Asphaltic Concrete
6.0"	Aggregate Base Course (minimum CBR = 85)
7.0"	Aggregate Subbase (minimum CBR = 25)
16.5"	Total Thickness

Alternate #2

2.5"	Asphaltic Concrete
6.5"	Asphaltic Concrete Base
9.0"	Total Thickness

Site Grading

The project site should be cleared of all vegetation, boulders, asphaltic concrete pavements, and other deleterious material. Any soft/loose and compressible soil exposed during clearing and grubbing operations should be removed and replaced with approved onsite soils or imported granular fill. In areas requiring fill placement, the existing ground should first be scarified to a depth of six inches, moistened if necessary to slightly above the optimum moisture content, and compacted to a minimum 90 percent compaction as determined by AASHTO T-180 (ASTM D 1557).

The onsite clayey silt may be reused as general fill and backfill. The excavated basalt may also be reused provided the material is crushed to a relatively well-graded gradation. All rock fragments larger than six inches in maximum diameter should be removed prior to compaction.

Imported material should consist of well-graded and non-expansive granular fill. Specifications for imported granular fill should indicate a maximum particle size of 3 inches, and state that between 8 and 20 percent of soil by weight shall pass the #200 sieve. In addition, the plasticity index (P.I.) of that portion of the soil passing the #40 sieve shall not be greater than 10. Granular fill should have a minimum CBR value of 20 and a CBR expansion value no greater than 1.0 percent as determined by AASHTO T-193 (ASTM D 1883).

For backfill behind the abutment structure, the backfill material should consist of Structural Backfill Material A as indicated in Section 703.20 of the Hawaii Standard Specifications or imported granular fill as specified above.

All fill placement should be in accordance with the Hawaii Standard Specifications for Road, Bridge, and Public Works Construction. Fill placed in areas which slope steeper than 5:1 (horizontal to vertical), should be continually benched as the fill is brought up in lifts.

Based on our borings, we believe that excavations into the surface clayey silt can be accomplished using conventional excavating equipment. Pneumatic equipment will be required for excavations into the medium hard to hard basalt.

All fill and cut slopes exposing surface soils should be stable at gradients of 2:1 (horizontal to vertical). Cut slopes exposing the slightly weathered basalt should be stable at gradients of 1:1 (horizontal to vertical) or flatter.

All slopes should be planted as soon as practical upon completion of grading to reduce the potential for erosion damage.

ADDITIONAL SERVICES

We recommend that we perform a general review of the final design plans and specifications. This will allow us to verify that the foundation and earthwork recommendations have been properly interpreted and implemented in the design plans and construction specifications.

For continuity, we recommend that we be retained during construction to (1) observe all probing and grouting operations, (2) check footing excavations prior to placement of reinforcing steel and concrete, (3) review and/or perform laboratory testing on import borrow to determine its acceptability for use in compacted fills, (4) observe and test structural fill placement, and (5) provide geotechnical consultation as required. Our services during construction will allow us to verify that our recommendations are properly interpreted and included in construction, and if necessary, to make modifications to those recommendations, thereby reducing construction delays in the event subsurface conditions differ from those anticipated.

LIMITATIONS

The boring logs indicate the approximate subsurface soil conditions encountered only at those times and locations where our borings were made, and may not represent conditions at other times and locations.

This report was prepared specifically for Sato & Associates, Inc. and their sub-consultants for design of the proposed replacement of Waiohonu Bridge in Hana, Maui. The boring logs, laboratory test results, and recommendations presented in this report are for design purposes only, and are not intended for use in developing cost estimates by the contractor.

During construction, should subsurface conditions differ from those encountered in our borings, we should be advised immediately in order to re-evaluate our recommendations, and to revise or verify them in writing before proceeding with construction.

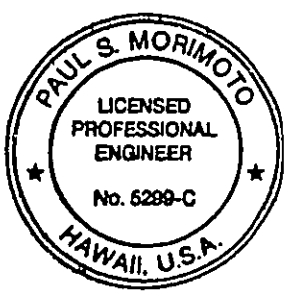
Our recommendations and conclusions are based upon the site materials observed, the preliminary design information made available, the data obtained from our site exploration, our engineering analyses, and our experience and engineering judgement. The conclusions and recommendations are professional opinions which we have strived to develop in a manner consistent with that level of care, skill, and competence ordinarily exercised by members of the profession in good standing, currently practicing under similar conditions. No other warranty is expressed or implied.

Respectfully submitted,

ERNEST K. HIRATA & ASSOCIATES, INC.

Con T. Truong, P.E.

Paul S. Morimoto, P.E.



This work was prepared by
me or under my supervision

APPENDIX

DESCRIPTION OF LABORATORY TESTING

CLASSIFICATION

Field classification was verified in the laboratory in accordance with the Unified Soil Classification System. Laboratory classification was determined by both visual examination and Atterberg Limit tests performed in general accordance with ASTM D 4318. Atterberg Limit tests performed on a sample obtained from boring B2 at a depth of about 14 feet resulted in a liquid limit of 65 and a plasticity index (P.I.) of 12. The final classifications are shown at the appropriate locations on the Boring Logs, Plates B1 through B6.

MOISTURE-DENSITY

Representative samples were tested for field moisture content and dry unit weight. The dry unit weight was determined in pounds per cubic foot while the moisture content was determined as a percentage of dry weight. Samples were obtained using a 3-inch O.D. split tube sampler. Test results are shown at the appropriate depths on the Boring Logs, Plates B1 through B6.

SHEAR TESTS

Shear tests were performed in the Direct Shear Machine which is of the strain control type. The rate of deformation was approximately 0.02 inches per minute. Each sample was sheared under varying confining loads in order to determine the Coulomb shear strength parameters, cohesion and angle of internal friction. Eighty percent of the maximum value was taken to determine the shear strength parameters. Test results are presented on Plate C.

PROCTOR TESTS

A Proctor test was performed on bulk samples to determine the optimum moisture content at which the various soil types compact to 100 percent density. The tests were performed in general accordance with ASTM D 698, and results are shown on Plate D.

MODIFIED CALIFORNIA BEARING RATIO TESTS

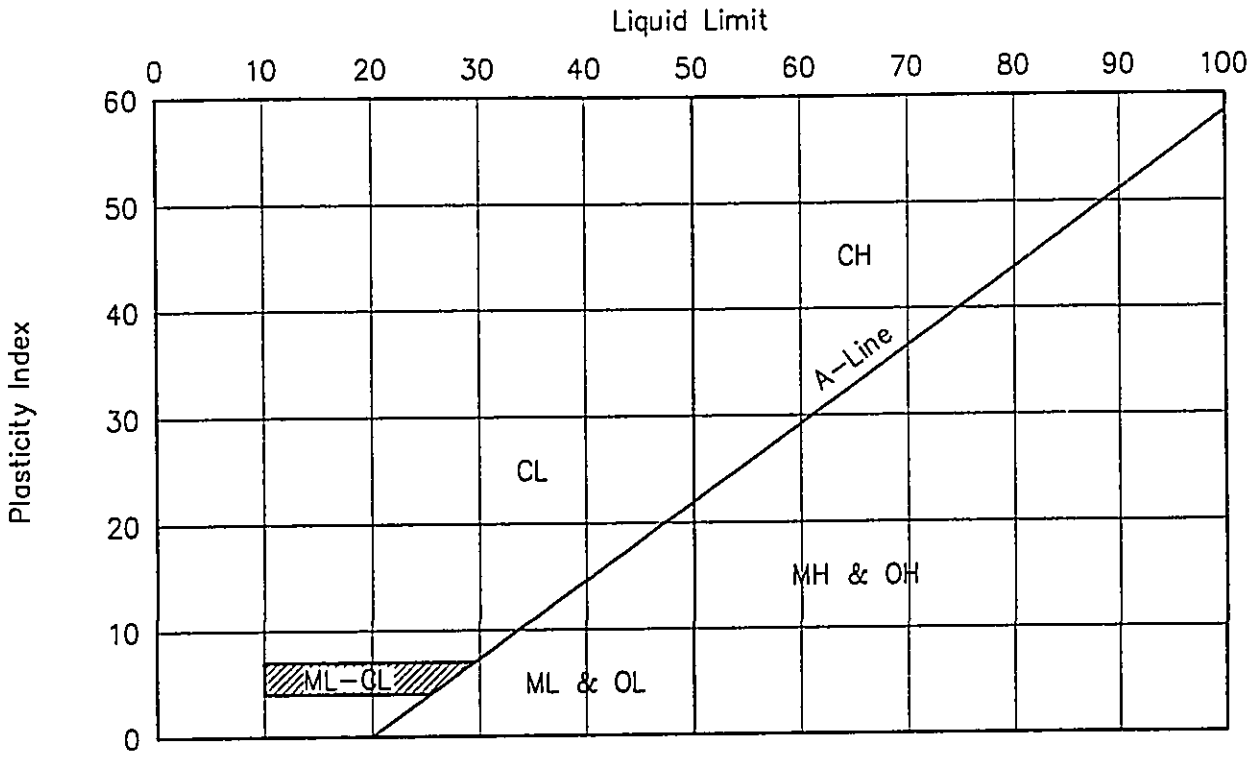
A modified CBR (Kentucky Method) test was performed on a bulk sample to evaluate the relative quality of subgrade soils to be used in the design of pavements. Test results are shown on Plate E.

MAJOR DIVISIONS			GROUP SYMBOLS		TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of the material is LARGER than No. 200 sieve size.)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines.)		GW	Well graded gravels, gravel–sand mixtures, little or no fines.
				GP	Poorly graded gravels or gravel–sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines.)		GM	Silty gravels, gravel–sand–silt mixtures.
				GC	Clayey gravels, gravel–sand–clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size.)	CLEAN SANDS (Little or no fines.)		SW	Well graded sands, gravelly sands, little or no fines.
				SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines.)		SM	Silty sands, sand–silt mixtures.
				SC	Clayey sands, sand–clay mixtures.
FINE GRAINED SOILS (More than 50% of the material is SMALLER than No. 200 sieve size.)	SILTS AND CLAYS (Liquid limit LESS than 50.)			ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
				OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50.)			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
				CH	Inorganic clays of high plasticity, fat clays.
				OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS				PT	Peat and other highly organic soils.
					FRESH TO MODERATELY WEATHERED BASALT
					VOLCANIC TUFF / HIGHLY TO COMPLETELY WEATHERED BASALT
					CORAL

SAMPLE DEFINITION		
2" O.D. Standard Split Spoon Sampler	Shelby Tube	RQD Rock Quality Designation
3" O.D. Split Tube Sampler	NX / 4" Coring	Water Level

W.O. 01–3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	BORING LOG LEGEND Plate A1

PLASTICITY CHART



GRADATION CHART

COMPONENT DEFINITIONS BY GRADATION	
COMPONENT	SIZE RANGE
Boulders	Above 12 in.
Cobbles	3 in. to 12 in.
Gravel Coarse gravel Fine gravel	3 in. to No. 4 (4.76 mm) 3 in. to 3/4 in. 3/4 in. to No. 4 (4.76 mm)
Sand Coarse sand Medium sand Fine sand	No. 4 (4.76 mm) to No. 200 (0.074 mm) No. 4 (4.76 mm) to No. 10 (2.0 mm) No. 10 (2.0 mm) to No. 40 (0.42 mm) No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and clay	Smaller than No. 200 (0.074 mm)

W.O. 01-3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	UNIFIED SOIL CLASSIFICATION SYSTEM Plate A2

Grade	Symbol	Description
Fresh	F	No visible signs of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	WS	Slight discoloration inwards from open fractures, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped by knife. Texture preserved.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	WC	Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Reference: Soils Mechanics, NAVFAC DM-7.1, Department of the Navy, Naval Facilities Engineering Command, September, 1986.

W.O. 01-3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	ROCK WEATHERING CLASSIFICATION SYSTEM Plate A3

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3500

BORING NO. B1 DRIVING WT. 140 lb. START DATE 11/28/01

SURFACE ELEV. 80±* DROP 30 in. END DATE 11/29/01

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (MH) – Dark grayish brown, moist, medium stiff, with sand, gravel, cobbles, and boulders.
			25/2"			
			10/No Penetration			
5			6	77	45	Firm to medium stiff at 4.5 feet.
10			33	110	13	
15						BASALT (WM) – Gray, medium hard, moderately weathered, with clinkers. Begin NX coring at 16 feet. 41% Recovery from 16 to 20 feet. RQD = 8% Grayish brown clinkers at 18 feet.
20						40% Recovery from 20 to 25 feet. RQD = 0% Clinker from 20 to 25 feet, medium dense to dense.
25						76% Recovery from 25 to 30 feet. RQD = 0% Gray basalt from 25 feet, highly fragmented, hard. Clinkers from 27 to 28 feet.
30						

Plate B1

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3500

BORING NO. B1 (continued) DRIVING WT. 140 lb. START DATE 11/28/01

SURFACE ELEV. 80±* DROP 30 in. END DATE 11/29/01

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						80% Recovery from 30 to 35 feet. RQD = 30% Clinkers from 33 to 34 feet.
35						BASALT (WS) - Gray, hard, slightly weathered. 88% Recovery from 35 to 40 feet. RQD = 62%
40						95% Recovery from 40 to 45 feet. RQD = 56%
45						66% Recovery from 45 to 47 feet. RQD = 16%
50						End boring at 47 feet. Groundwater not encountered in boring. * Elevations based on topographic survey map provided by Sato & Associates, Inc., dated 12/28/01.
55						
60						

Plate B2

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3500

BORING NO. B2 DRIVING WT. 140 lb. START DATE 11/29/01

SURFACE ELEV. 80± DROP 30 in. END DATE 12/3/01

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (MH) – Dark grayish brown, moist, medium stiff, with sand, gravel, cobbles, and boulders.
		☐	14	71	24	
5						Boulder at 4 feet.
		☐	28			
10		☐	17	84	23	Boulder from 10 to 14 feet.
15		☐	19	89	33	
						BASALT (WS) – Gray, hard, slightly weathered. Begin NX coring at 16 feet. 96% Recovery from 16 to 21 feet. RQD = 86%
20						100% Recovery from 21 to 26 feet. RQD = 90%
25						100% Recovery from 26 to 31 feet. RQD = 97%
30						

Plate B3

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3500

BORING NO. B2 (continued) DRIVING WT. 140 lb. START DATE 11/29/01

SURFACE ELEV. 80± DROP 30 in. END DATE 12/3/01

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						78% Recovery from 31 to 46 feet. RQD = 53%
35						CLINKER (GP) – Reddish brown, medium dense to dense, with hard basalt lens. 70% Recovery from 36 to 41 feet. RQD = 6%
40						
45						BASALT (WS) – Gray, hard, slightly weathered. 100% Recovery from 41 to 46 feet. RQD = 66% Reddish brown clinker at 45 feet.
50						End boring at 46 feet. Groundwater not encountered in boring.
55						
60						

Plate B4

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3500

BORING NO. B3 DRIVING WT. 140 lb. START DATE 4/10/02

SURFACE ELEV. 64± DROP 30 in. END DATE 4/10/02

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						BASALT (WS) – Gray, medium hard to hard, highly fractured, slightly weathered, with clinkers. Begin NX coring from 1 foot. 76% Recovery from 1 to 6 feet. RQD = 18%
5						Clinker from 6.5 feet. 28% Recovery from 6 to 11 feet. RQD = 15%
10						
15						30% Recovery from 11 to 16 feet. RQD = 8%
20						BASALT (WS) – Gray, hard, slightly weathered. 88% Recovery from 16 to 21 feet. RQD = 45%
25						End boring at 21 feet. Groundwater not encountered in boring.
30						

Plate B5

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

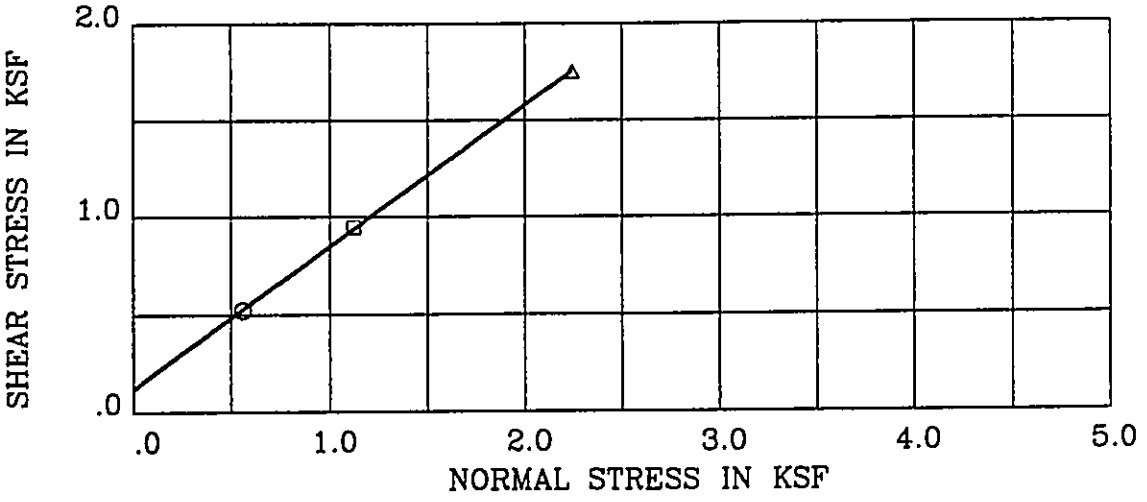
W.O. 01-3500

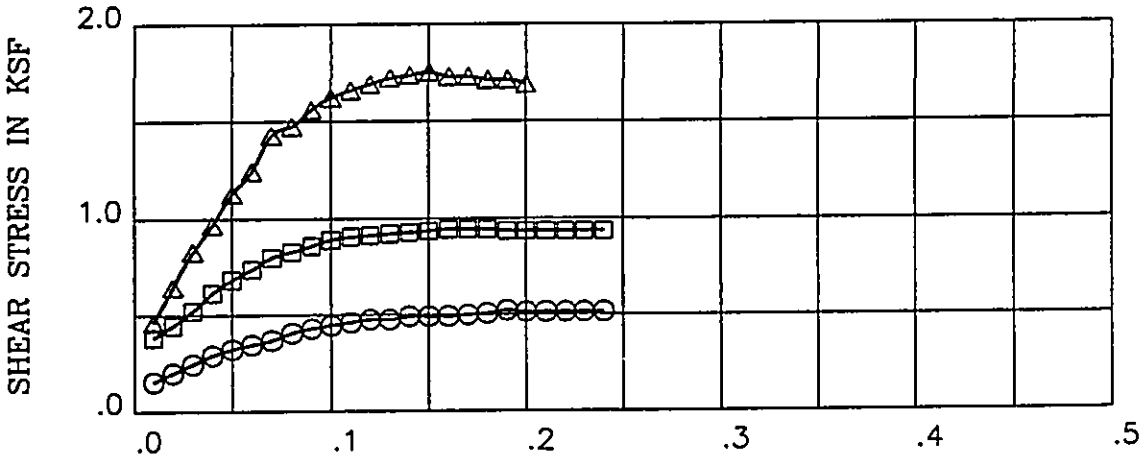
BORING NO. B4 DRIVING WT. 140 lb. START DATE 4/23/02

SURFACE ELEV. 65± DROP 30 in. END DATE 4/23/02

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						BASALT (WS) – Gray, hard, slightly weathered, with clinkers. Begin NX coring from 1 foot. 100% Recovery from 1 to 6 feet. RQD = 90%
5						100% Recovery from 6 to 11 feet. RQD = 93%
10						85% Recovery from 11 to 16 feet. RQD = 25% Clinkers from 12.5 feet.
15						100% Recovery from 16 to 17 feet. RQD = 0%
20						End boring at 17 feet. Groundwater not encountered in boring.
25						
30						

Plate B6





BORING/SAMPLE : B1 DEPTH (ft) : 4

DESCRIPTION : Dark grayish brown clayey silt

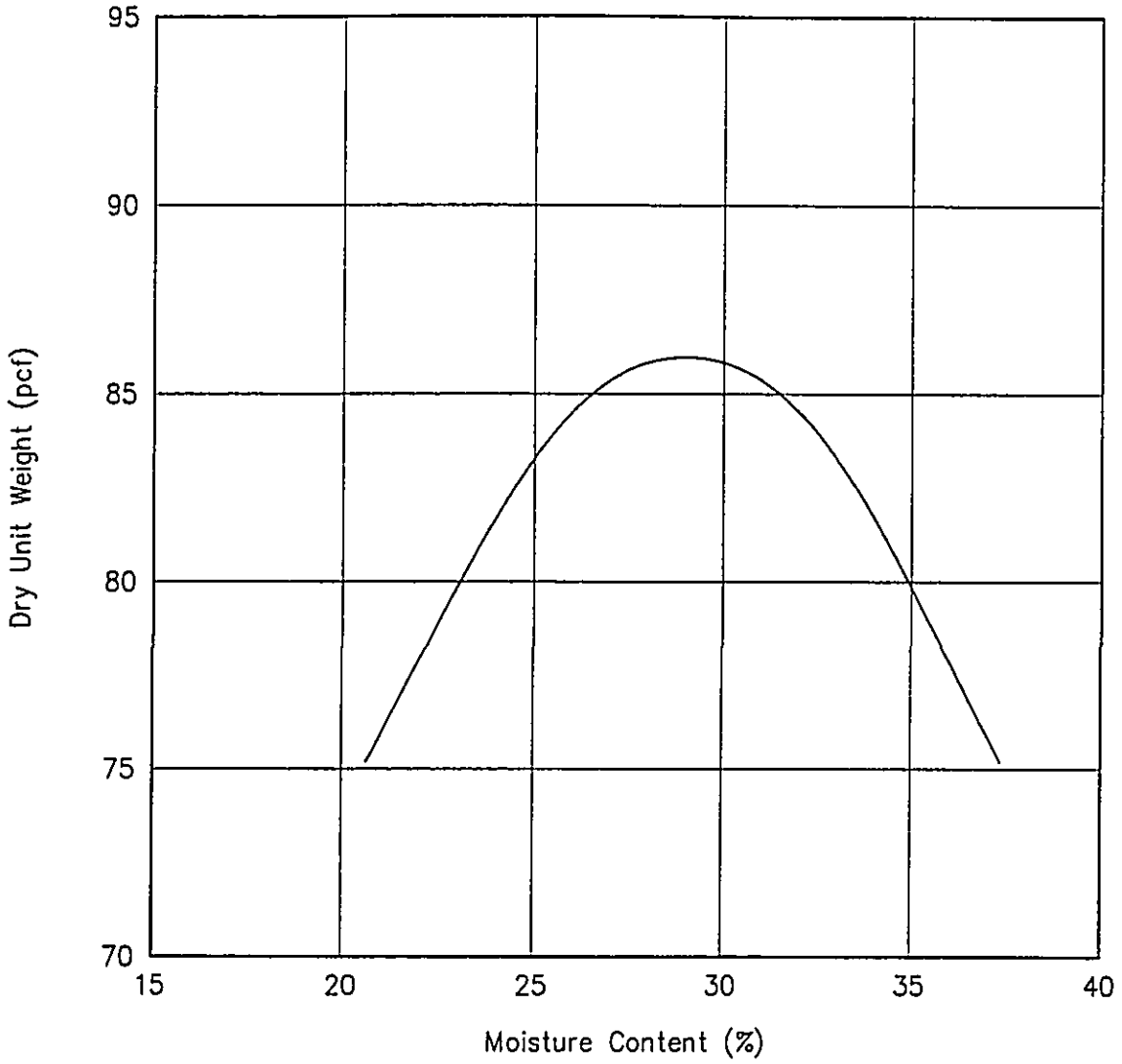
STRENGTH INTERCEPT (C) : .119 KSF (PEAK STRENGTH)

FRICTION ANGLE (PHI) : 36.1 DEG (PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	44.7	76.9	1.192	.56	.52	.51
□	44.7	76.9	1.192	1.12	.95	.94
△	44.7	76.9	1.192	2.24	1.75	1.69

Remark : Date: 12/17/01

W.O. 01-3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	DIRECT SHEAR TEST Plate C



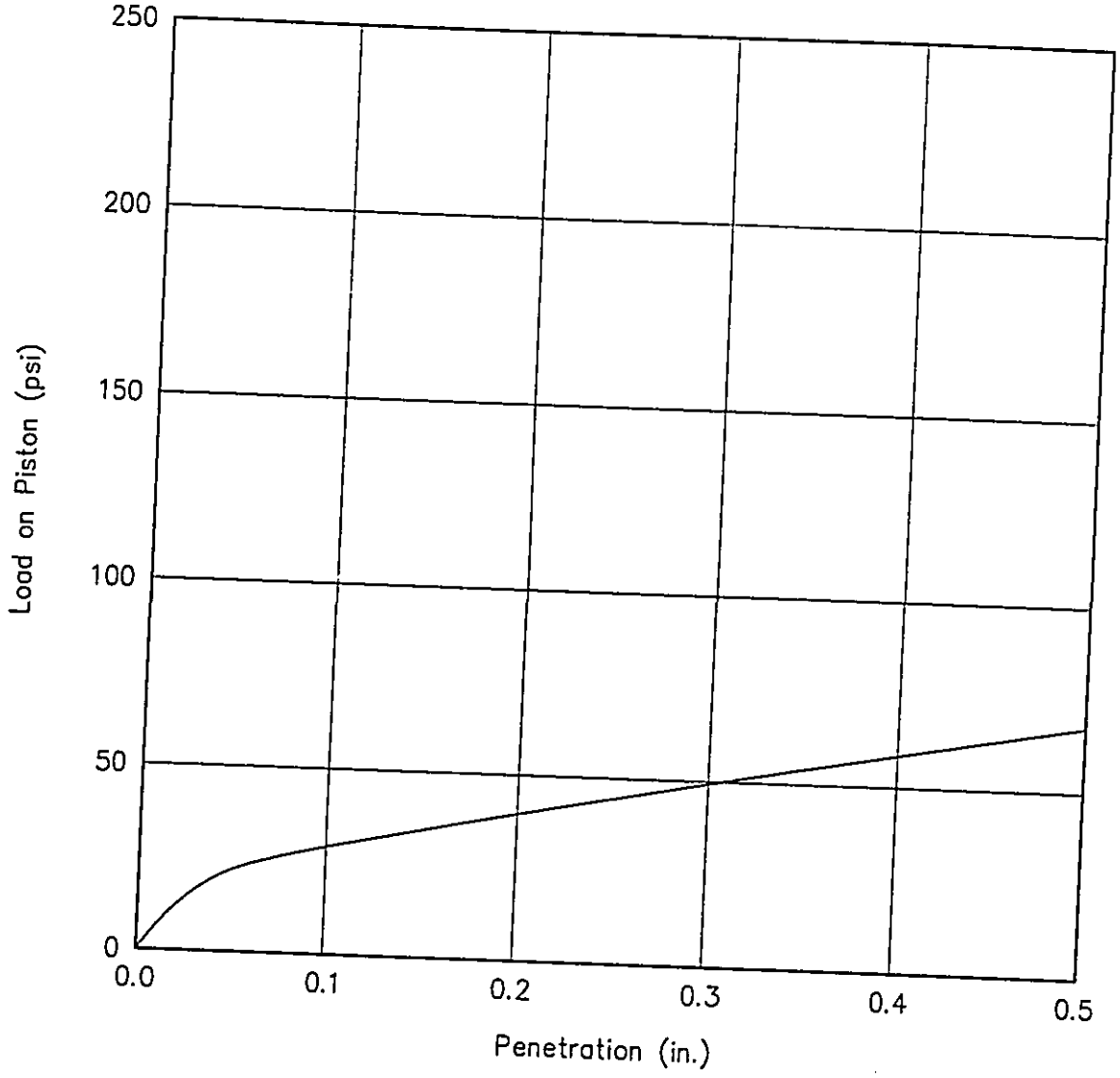
Soil Data

Location: Boring B1 at near surface
Description: Dark grayish brown clayey silt

Test Results

Maximum Dry Density: 86 pcf
Optimum Moisture Content: 29%

W.O. 01-3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	PROCTOR CURVE Plate D



Soil Data

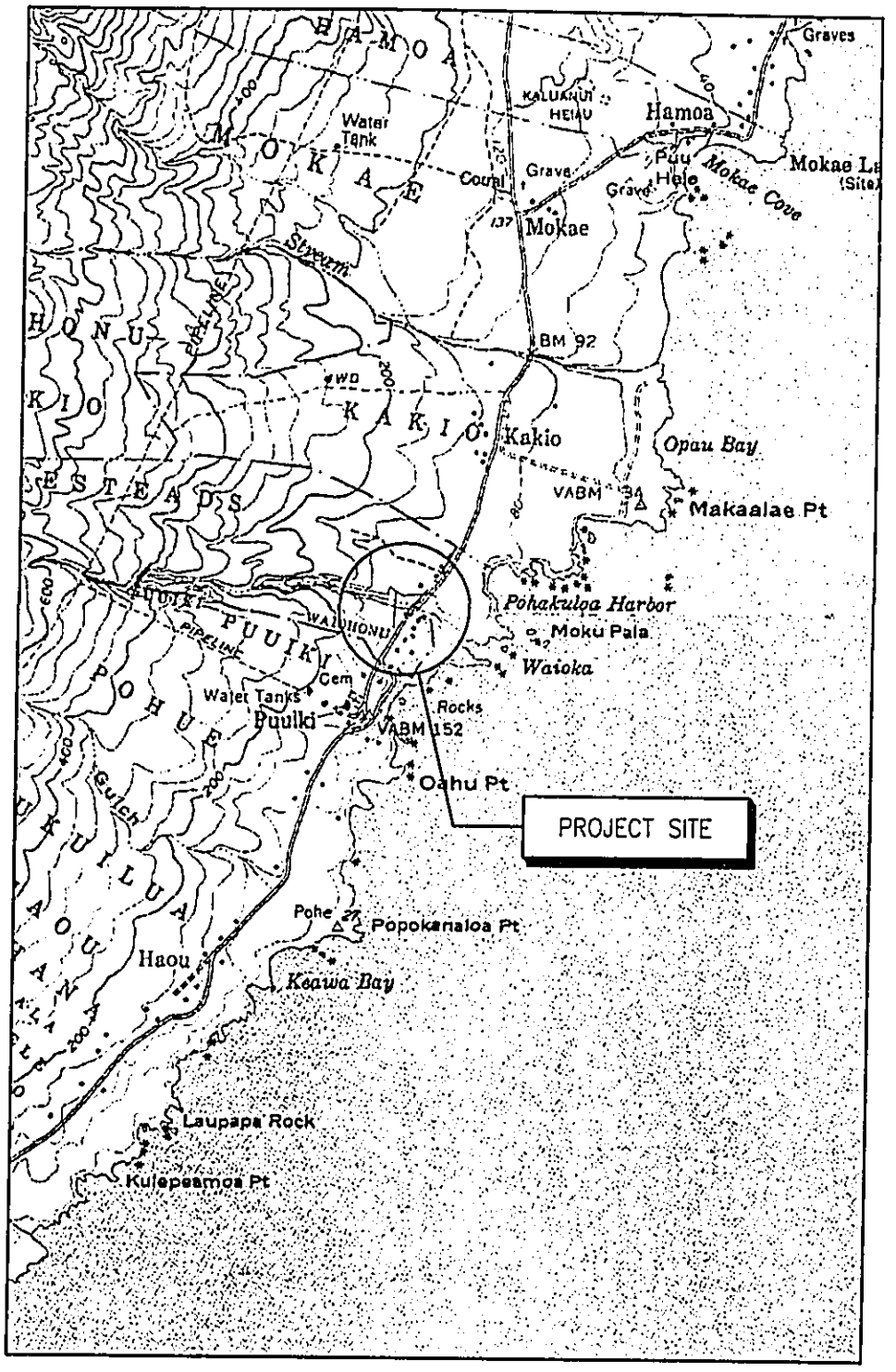
Location:	Boring B1 at near surface
Description:	Drak grayish brown clayey silt
Sample Dry Density:	86 pcf
Sample Moisture Content:	28.5%

Test Results

CBR Value:	3%
Expansion:	1.1%

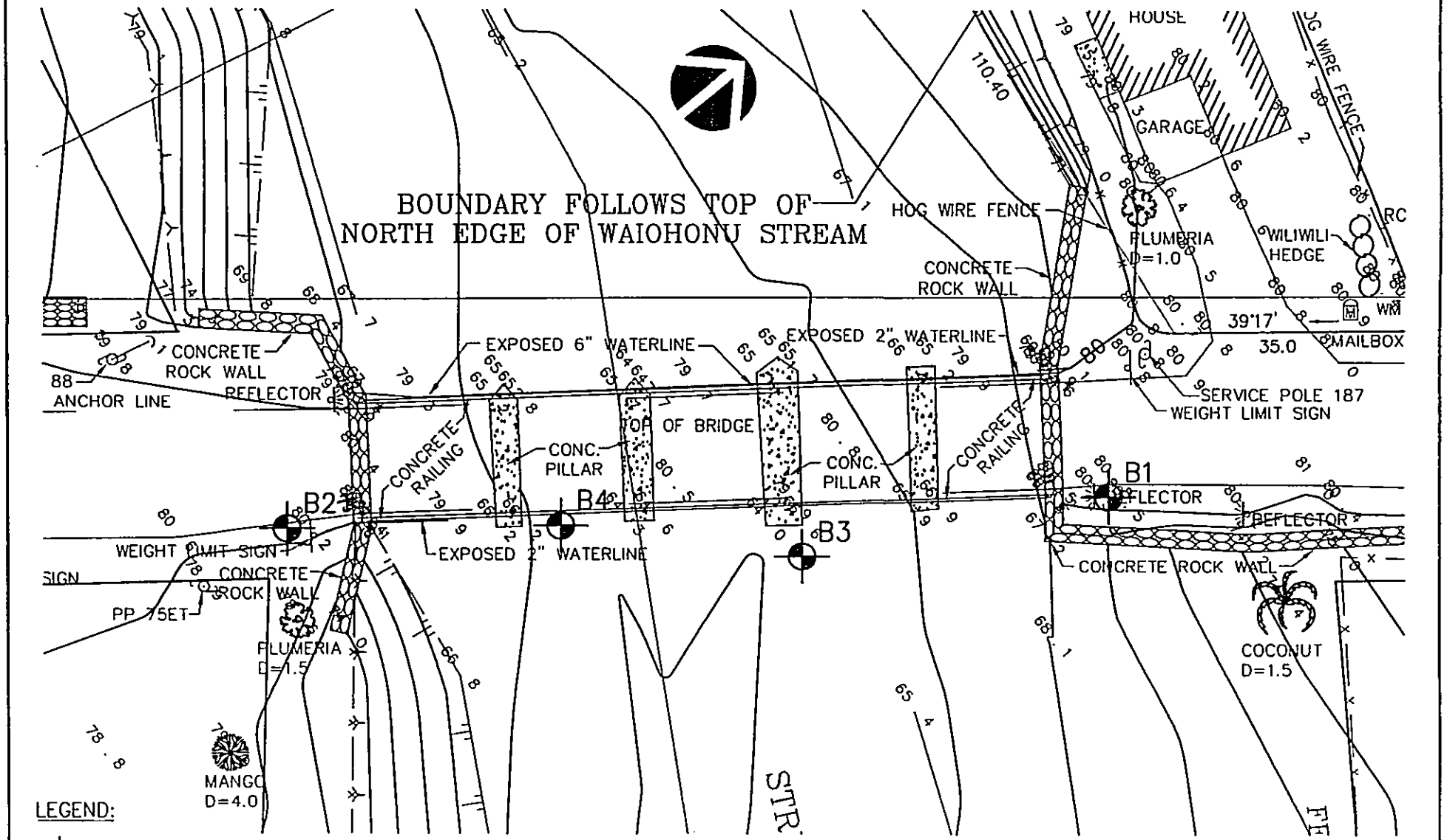
Note: Modified CBR, Kentucky Method.

W.O. 01-3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	CBR STRESS PENETRATION CURVE Plate E



Reference: Topographic quadrangle map prepared by the United States Department of the Interior Geologic Survey

W.O. 01-3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	LOCATION MAP Plate 1



Reference: Topographic Survey Map provided by Sato & Associates, Inc., dated 12/28/01.

W.O. 01-3500	Waiohonu Bridge Replacement, Hana, Maui
Ernest K. Hirata & Associates, Inc.	BORING LOCATION PLAN

Plate 2

APPENDIX D

Waiohonu Bridge Replacement Project,
Biological Resources Survey for Waiohonu Stream

Xamanek Researches

August 2002

WAIOHONU BRIDGE REPLACEMENT PROJECT
BIOLOGICAL RESOURCES SURVEY
WAIOHONU STREAM
EAST MAUI, HAWAI'I

Prepared for:
Department of Public Works
& Waste Management
County of Maui
Wailuku, Maui

Prepared by:
David Paul

Xamanek Researches
Pukalani, Maui

December 7, 2001

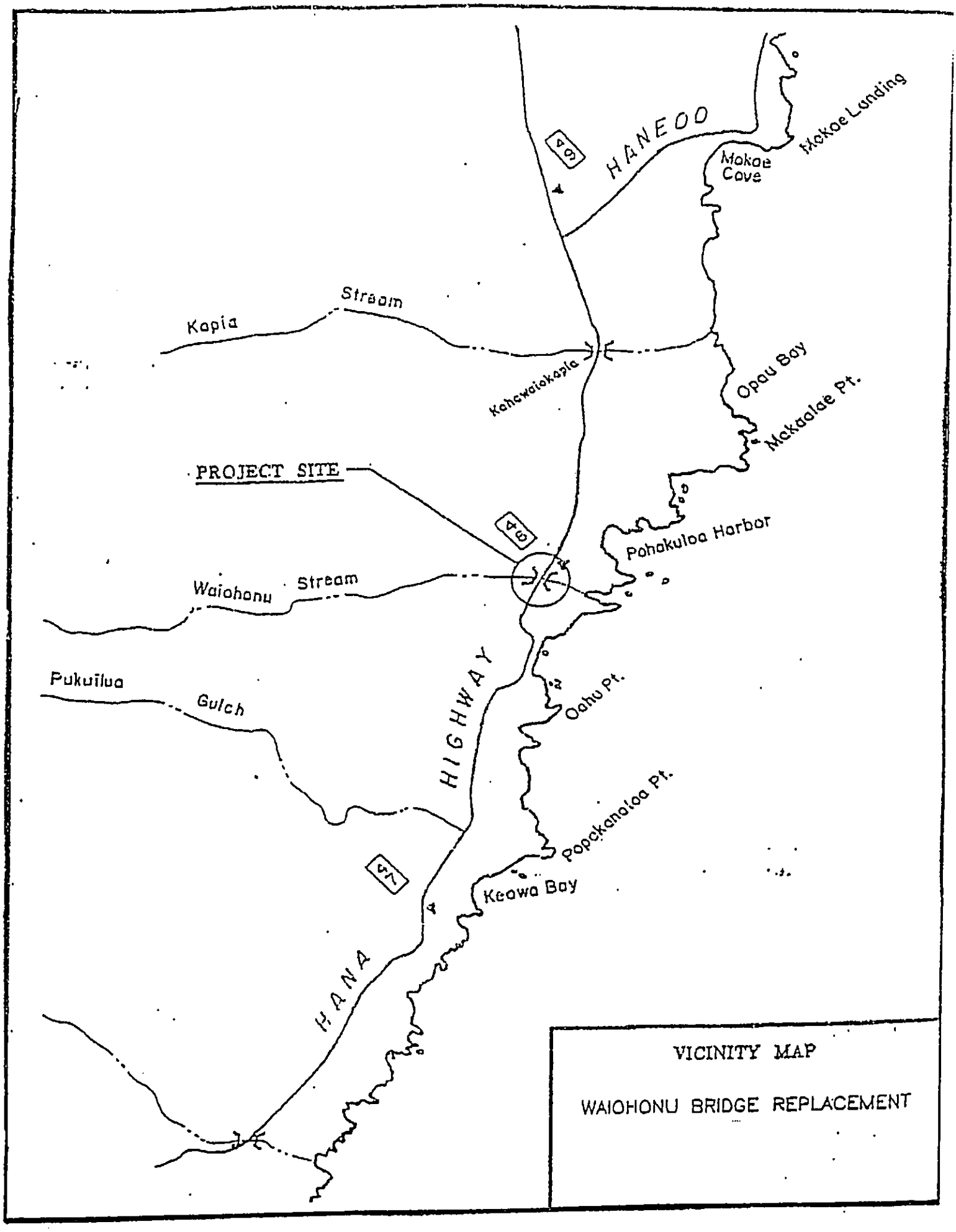


Figure 1. Location of the project (map provided by Sato & Associates, Inc.).

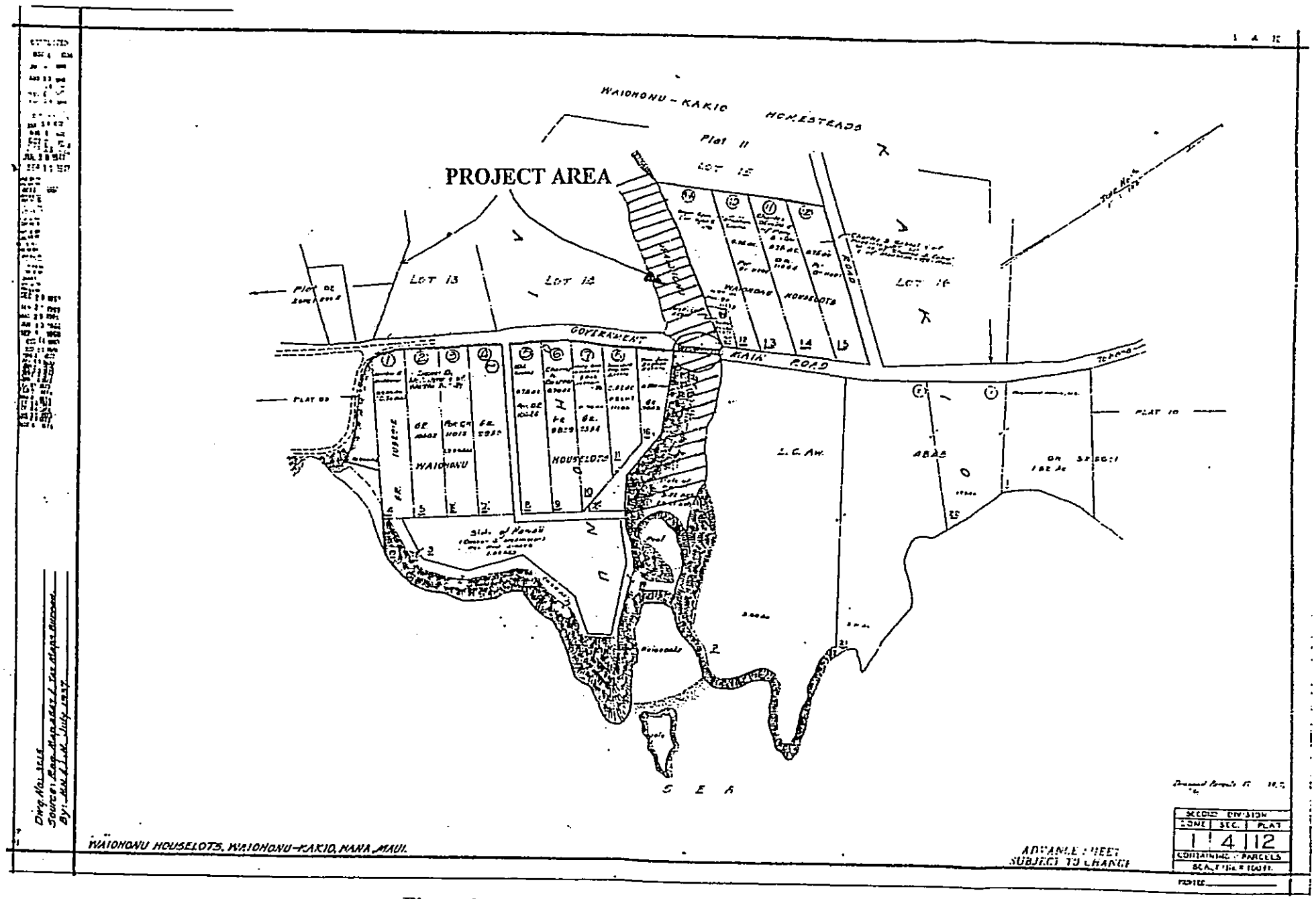


Figure 2 – Tax map, showing location of study area.

BIOLOGICAL RESOURCES SURVEY

SUMMARY

No vascular plant species was found in the project area that has protection under Federal or State Law. No insect, mollusk, fish, amphibian, avian, or mammalian animal species were found in the project area that has protection under Federal or State Law.

Therefore, there are no biological resources found in the proposed corridor that require consideration for planning in the project, as long as the action of the project are kept to a minimum.

INTRODUCTION

On December 5, 2001, David Paul and Erik Fredericksen of Xamanek Researches conducted a Biological Resources Survey of the study area for the Waiohonu Bridge Replacement Project (Figures 1 and 2).

The area for the project runs 200 ft. upstream and 200 ft. downstream from Waiohonu Bridge, and includes the Waiohonu Stream bed and the margins on both sides of the stream.

The survey provided information necessary to describe the vegetation and fauna in the project area and determine if any species of vascular plant or animal found there is protected under Federal or State Law, which would require consideration for planning in the project.

METHODS

The survey was conducted by traversing the proposed corridor for the project and recording every vascular plant and animal species encountered in the area.

Each plant species was identified by using keys and descriptions from *PTERIDOPHYTES OF HAWAI'I: Identification Key* (Wagner, W.H. & Wagner, F.S. 1992), *Manual of the Flowering Plants of Hawai'i* (Wagner, W.L. et. al. 1990), and *Ferns of Hawai'i* (Valier, K. 1995).

Each avian species was identified by using descriptions from *A Field Guide To The Birds of Hawaii and the Tropical Pacific.* (Pratt, H.D. et al. 1987).

Insects, mollusks, fish, amphibians, and mammals were identified by using descriptions from *Hawaiian Damselflies: A Field Identification Guide.* (Polhemus, D. & Asquith, A. 1996), and *Hawai'i's Invasive Species.* (Staples, G.W. & Cowie, R.H. 2001).

RESULTS

VASCULAR PLANTS

The species of vascular plants encountered during the Biological Resources Survey are members of a Lowland Mesic Forest Community, which is dominated by invasive alien plants.

The most notable plants in the project area are the Java plum (Sysygium cumuni) and elephant grass (Pennisetum purpureum) which encroach on and are spread by waterways. Java plum is making a dominant and spreading canopy, and elephant grass is dominant and out-competing other plants in the understory, especially on the stream margins.

A few plants of Polynesian introduction were found in the corridor; such as *'ape* (Alocasia macrorrhiza), coconut (Cocos nucifera), *kukui* (Aleurites moluccana), *noni* (Morinda citrifolia), and ti (Cordyline fruticosa). These plants lend testimony to the cultural history of the area.

A few indigenous plants (native to Hawai'i and elsewhere) were found in the corridor; such as *hala* (Pandanus tectorius), *ka'e'e* (Mucuna gigantea), and *laua'e* (Phymatosorus scolopendrium). No endemic plants (unique to Hawai'i) were located in the study area.

No vascular plants with protection under Federal or State Law were encountered in the project area.

A summary of the vascular plants encountered during the survey is found in Table 1 (*List of Vascular Plant Species*) at the end of this report.

WAIOHONU STREAM LIFE

Waiohonu Stream is an intermittent stream fed by runoff from rainwater. There are several large pools in the streambed, and many isolated smaller pools. These pools provide the potential for several forms of aquatic life.

During the survey each pool was investigated for any forms of life which may occur there.

In the pools closest to Waiohonu Bridge there was almost nothing alive with the exception of some mosquito larvae in small pools along the stream margin on the south side of the stream. The mosquito larvae were most numerous in pools that had decaying Java plum fruit. The lack of life next to the bridge is likely due to the ongoing insecticide-spraying program to control Dengue Fever.

In pools further *mauka* and *makai* of the bridge, much more faunal activity was observed. The most abundant life was the bufo toad tadpole (Bufo marinus) which was found in many of the pools—especially the larger ones. A bufo toad adult was also encountered sitting in the dry part of the streambed, mauka of the bridge. Bufo toads are invasive predators that eat almost anything they can fit in their mouths. As both adult bufo toads and tadpoles are toxic, anything that eats them becomes ill or dies.

The next most notable life form noted in the pools were dragonfly nymphs. A few dragonfly nymphs were found *mauka* of the bridge, but they were most numerous in pools on the *makai* side; especially in a few of the larger pools closest to the waterfall below the bridge. A single adult *pinao* or Hawaiian dragonfly (Anax strenuus) was observed flying along the stream, and several adult Chinese dragonflies (Crocothemis servilia) were seen in flight. Two pairs of Chinese dragonflies were observed ovipositing (laying eggs) in the pools.

Aside from bufo toad tadpoles and dragonfly nymphs, just a few more mosquito larvae were observed in pools mauka of the bridge.

No other aquatic life forms were observed in the study corridor for the project, including fish, mollusks, or damselfly nymphs.

Other animal life encountered in the study corridor included; a honey bee (Apis mellifera) crawling on the streambed, a spiny-backed spider (Gasteracantha mammosa) hanging in the vegetation on the stream margin, vinegar flies (Drosophila melanogaster) feeding on Java plum fruit in the streambed and it's margins, and a brown slug (Vaginalis plebius) along the stream margin.

There was evidence of rats (Rattus sp.) feeding along the stream margin; that being discarded piles of Java plum seeds, freshly cleaned of their fruit.

Three avian species were seen in the area; a house sparrow (Passer domesticus), spotted doves (Streptopelia chinensis), and mynah birds (Acridotheres tritis).

No animal species with protection under Federal or State Law was encountered in the project area.

A summary of the animal life encountered during the survey is found in Table 2 (*List of Animal Species*) at the end of this report.

RARE STREAM LIFE

There is concern that species unique to Hawai'i and protected by Federal and State Law might be found in the proposed corridor and compromised by the actions of the project. Therefore species with legal status were reviewed from *Listed and Candidate Species, as Designated Under the U.S. Endangered Species Act.* (USFWS, 1997 & 1998).

The *o 'opu alamo 'o* (Lentipes concolor) is a rare native fish with a non-protected status of Species Of Concern. It usually occurs in the upper reaches of streams, but has been known to exist at lower elevations. The *o 'opu alamo 'o* was not found in the study corridor at the time of the survey. It is interesting to note that no other fish were present at the time of the study.

A rare Hawaiian damselfly (Megalagrion pacificum) is known to occur in the lower reaches of streams on East Maui, and has a protected status as a Candidate for listing as Endangered. This small damselfly is about 3.5 cm (1.4 in) long, is mostly black with brick red markings on it's lower thorax and the end of it's abdomen. It does not fly very far and perches on vegetation near it's breeding pools which are located on stream margins and in overflow channels.

No damselfly nymphs were found in pools of the stream or it's margins. In addition, no adults of any damselfly species were noted in the vegetation of the stream margins, nor were they observed flying anywhere in the proposed corridor. There is an overflow channel adjacent to the corridor *mauka* of the bridge, which was dry at the time of the survey. There were no species of damselflies observed in this area either.

RECOMMENDATIONS

No species of vascular plants or animals were found in the project area that have protection under Federal or State Law.

There is a low potential for the establishment of endemic and legally protected species of plants in the area due to the invasive alien plants that occur there. However, there are several pools along the stream margins with open habitat that could be potential breeding grounds for damselflies, including the rare endemic Megalagrion pacificum.

The intensive spraying of insecticides near the bridge to control Dengue Fever has likely impacted the ability of aquatic life to reproduce there. As this threat to human health comes under control and the spraying desists, habitat will open back up, closer to the bridge.

It is recommended that the actions of the project be confined as close to the bridge as possible, and that debris from the project should be kept out of the streambed as much as possible. If these guidelines are followed, impacts to the environment and the potential habitat will be kept to a minimum.

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KEY TO SPECIES LISTS:

Genus / species - Binomial term given to a life form.

Common Name - Locally used term for a life form.

Distribution - Geographical origin of a species.

A = Alien; introduced to Hawai'i after 1778 AD.

P = Polynesian; introduced to Hawai'i prior to 1778 AD.

I = Indigenous; native to Hawai'i and elsewhere.

E = Endemic; unique to Hawai'i.

Table 1. **List of Vascular Plant Species**

PTERIDOPHYTES

FAMILY Genus / species	Common Name	Distribution
ADIANTACEAE	Maidenhair Fern Family	
Adiantum raddianum	maidenhair	A
BLECHNACEAE	Blechnum Fern Family	
Blechnum occidentale L.	blechnum	A
LINDSAEACEAE	Lace Fern Family	
Odontosoria chinensis (L.) J. Sm.	*pala'a*	I
NEPHROLEPIDACEAE	Sword Fern Family	
Nephrolepis multiflora	sword fern	A
PÓLYPODIACEAE	Common Fern Family	
Phymatosorus scolopendrium (Burm.) Pic.- Ser.	*laua'e*	I
PSILOTACEAE	Wisk Fern Family	
Psilotum nudum (L.) Beauv.	*moa*	I
THELYPTERIDACEAE	Maiden Fern Family	
Thelypteris dentata H. Wag.	oak fern	A

DICOTYLEDONS

ACANTHACEAE	Acanthus Family	
Hemigraphis reptans (Forst.) Andrsn.	metal-leaf	A
Thunbergia fragrans Roxb.	clock vine	A
ANACARDIACEAE	Mango Family	
Mangifera indica L.	mango	A
Schinus terebinthifolius Raddi	Christmasberry	A
APIACEAE	Parsley Family	
Centella asiatica (L.) Urb.	pennywort	A
ARAILIACEAE	Ginseng Family	

Shefflera actinophylla (Endl.) Harms	octopus tree	A
ASTERACEAE	Sunflower Family	
Ageratina riparia (Regel) King & Robnsn.	*pamakani*	A
Ageratum conyzoides L.	*maile hohono*	A
Conyza bonariensis (L.) Cronq.	hairy horseweed	A
Pluchea symphytifolia (Mill.) Gillis	sourbush	A
Vernonia cinerea (L.) Less.	little ironweed	A
Wedelia trilobata (L.) Hitchc.	wedelia	A
Youngia japonica (L.) DC	little hawksbeard	A
BIGNONIACEAE	Bignonia Family	
Spathodea campanulata P.Beauv.	African tulip tree	A
CACTACEAE	Cactus Family	
Hylocereus undatus (Haw.) Brit. & Rose	night blooming cereus	A
CARYOPHYLLACEAE	Pink Family	
Drymaria cordata (L.) Willd.ex Rm.& Schlt.	drymary	A
Spergula arvensis L.	spurry	A
CONVOLVULACEAE	Morning Glory Family	
Ipomoea alba L.	moon flower	A
Merremia tuberosa (L.) Rendle	wood rose	A
CUCURBITACEAE	Cucumber Family	
Momordica charantia L.	bitter melon	A
EUPHORBIACEAE	Poinsettia Family	
Aleurites moluccana (L.) Willd.	*kukui*	P
Euphorbia heterophylla L.	*kaliko*	A
Phyllanthus debilis Klein ex Willd.	niruri	A
FABACEAE	Bean Family	
Chamaecrista nictitans (L.) Moench	partridge pea	A
Crotalaria retusa L.	rattlepod	A
Desmodium intortum (Mill.) Urb.	tick clover	A
Desmodium triflorum (L.) DC	tick clover	A
Indigofera suffruticosa Mill.	indigo	A
Mucuna gigantea (Willd.) DC	*ka'e'e*	I
Senna septemtrionalis (Viv.) Irw.& Barn.	*kolomona*	A
LAMIACEAE	Mint Family	
Hyptis pectinata (L.) Poit.	comb hyptis	A
LYTHRACEAE	Loosestrife Family	
Cuphea carthagenensis (Jacq.) Macbr.	tarweed	A

Cuphea hyssopifolia Kunth.	false heather	A
MELASTOMATACEAE	Melastoma Family	
Clidemia hirta (L.) D. Don	Koster's curse	A
Dissotis rotundifolia (Sm.) Triana	dissotis	A
MORACEAE	Fig Family	
Ficus microcarpa L. fil.	banyan	A
MYRSINACEAE	Myrsine Family	
Ardisia elliptica Thunb.	shoebutton ardisia	A
MYRTACEAE	Myrtle Family	
Psidium cattleianum Sabine	strawberry guava	A
Psidium guajava L.	guava	A
Syzygium cumini (L.) Skeels	Java plum	A
ONAGRACEAE	Evening Primrose Family	
Ludwigia octovalvis (Jacq.) Raven	*kamole*	P
OXALIDACEAE	Wood Sorrel Family	
Oxalis corniculata L.	*'ihi*	P
PASSIFLORACEAE	Passion Flower Family	
Passiflora edulis Sims	passion fruit	A
RUBIACEAE	Coffee Family	
Morinda citrifolia L.	*noni*	P
URTICACEAE	Nettles Family	
Pilea microphylla (L.) Liebm.	artillery plant	A
VERBENACEAE	Verbena Family	
Stachytarpheta urticifolia (Salisb.) Sims	blue vervain	A

MONOCOTYLEDONS

AGAVACEAE	Agave Family	
Cordyline fruticosa (L.) Chev.	ti / *ki*	P
ARACEAE	Philodendron Family	
Alocassia macrorrhiza (L.) Schott	*'ape*	P
Epipremnum pinnatum (L.) Engl.	philodendron	A

ARECACEAE	Palm Family	
Archontophoenix alexandre (F.v.Muell.) Wend.& Drude	king palm	A
Cocos nuciferaL.	coconut / *niu*	P
COMMELINACEAE	Spiderwort Family	
Commelina diffusa Burm.	*honohono*	A
CYPERACEAE	Sedge Family	
Pycreus polystacyos (Rottb.) Beauv.	*kili'o'opu*	I
Rhynchospora chinensis Nees & Meyen	*kuolohia*	I
DIOSCOREACEAE	Yam Family	
Dioscorea bulbifera L.	*hoi*	P
PANDANACEAE	*Screwpine Family*	
Pandanus tectorius Parknsn. ex Z	*hala*	I
POACEAE	Grass Family	
Andropogon virginicus L.	broomsedge	A
Axonopus fissifolius (Raddi) Kuhlm.	carpetgrass	A
Eleusine indica (L.) Gaertn.	wiregrass	A
Oplismenus hirtellus (L.) P. Beauv.	basketgrass	A
Paspalum scrobiculatum L.	*mau'u laiki*	I
Pennisetum purpureum Schumch.	elephant grass	A
Sacciolepis indica (L.) Chase	Glenwood grass	A
Sporobolus indicus (L.) R. Br.	smutgrass	A

Table 2. **List of Animal Species**

Genus / species	Common Name	Distribution
MAMMALS		
Rattus sp.	rat	A
AVIANS		
Acridotheres tristis	mynah bird	A
Passer domesticus	house sparrow	A
Streptopelia chinensis	spotted dove	A
AMPHIBIANS		
Bufo marinus	bufo toad	A
MOLLUSKS		
Vaginulus plebius	brown slug	A
INSECTS & ARTHROPODS		
Anax strenuus	Hawaiian dragonfly / *pinao*	E
Apis mellifera	honey bee	A
Crocothemis servilia	Chinese dragonfly	A
Drosophila melanogaster	vinegar fly	A
Gasteracantha mammosa	spiny backed spider	A

APPENDIX E

Stream Survey for the Waiohonu Bridge Replacement Project

R.A. Englund and D.J. Preston
Hawaii Biological Survey
Bishop Museum

August 2002

Stream Survey for the Waiohonu Maui, Bridge Replacement Project

Prepared for:

Sato & Associates

2046 S. King Street, Honolulu, Hawaii 96826

Prepared by:

R.A. Englund and D.J. Preston

Hawaii Biological Survey

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Honolulu, Hawai'i 96817

January 2002

Contribution No. 2002-003 to the Hawaii Biological Survey

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Table

Executive Summary

The Hawaii Biological Survey of the Bishop Museum conducted an assessment from December 18-19, 2001, of native and introduced aquatic biota in association with the Waiohonu bridge Replacement Project, Hāna, Maui. No Federally endangered or Federal listed Species of Concern were observed during these surveys. Waiohonu Stream in the area of the Hāna Highway is intermittent and contained no native stream biota such as fish, aquatic insects, mollusks, or crustaceans during the assessment. However, a permanent estuary pool likely fed by some groundwater seepage or intermittent stream flow, and ocean water from wave action contained only native species, several of which are relatively uncommon and only found in high quality aquatic habitats. The stream estuary area is significant in that no alien aquatic species were observed, which is now very unusual in the Hawaiian Islands. If proper construction practices are used, no impacts to native stream biota should occur as the result of construction during the proposed Waiohonu bridge replacement project. Best management practices should be employed during construction to prevent soil erosion into the highly pristine estuary area and nearshore ocean areas.

Introduction

The Hawaii Biological Survey of the Bishop Museum conducted an assessment from December 18-19, 2001, of native and introduced aquatic biota in association with the Waiohonu bridge Replacement Project, Hāna, Maui. This survey documented the major constituents of the aquatic biota found within Waiohonu Stream in proximity of the Hāna Highway. The objectives of the fish and aquatic invertebrate assessment of Waiohonu Stream were to 1) describe baseline distribution and abundance of native and introduced fish species, crustaceans, mollusks, and aquatic insects, as well as introduced amphibians, 2) evaluate habitat quality for aquatic biota, and 3) evaluate potential environmental impacts associated with construction activities during the Waiohonu Stream bridge Replacement Project.

Study Area

Waiohonu Stream is located on the eastern tip of Maui, near Hāna, and the Hāna Highway bridge crossing lies within the village of Pu'uiki. This survey began 200 m upstream of the Waiohonu Stream bridge and extended downstream into a large estuary pool at the ocean. Waiohonu Stream in the vicinity of Hāna Highway is intermittent, and only flows after periods of heavy rains. Evidence of the stream being intermittent in the area of the bridge

was the complete lack of algae on the rocks, no sediment or gravel in the streambed, and no permanent aquatic insect or other aquatic fauna.

Downstream of the Waiohonu Stream bridge, two large cascades drop through a deeply incised columnar basalt channel. The most upstream cascade drops approximately 50 ft. and shortly thereafter a second large cascade drops another 40 ft. over a series of sheer bedrock. The terminal estuary pool at the ocean lies at the end of the second cascade. Surface salinities in the deep (> 10 ft.) terminal estuary pool were 6 ppt, and this pool likely receives groundwater input as well. Because of recent heavy rains, Waiohonu Stream was flowing to the terminal estuary pool during our visit, and this increase in stream flow may also have resulted in decreased salinities.

Methods – Aquatic Biota Sampling

Sampling took place during a period of sunny weather and very good conditions on December 18-19, 2001. Above water observation, hand-netting, and small seines were used to assess aquatic species composition at Waiohonu Stream. Because Waiohonu Stream is intermittent in the vicinity of the Hāna Highway, and was only slightly flowing because of recent rains, snorkeling was not feasible except at the estuary pool. Good water clarity at the estuary pool allowed for snorkeling at this area, and all species observed were recorded. Hand-netting, benthic sampling, and above-water observations were used both in the area of the Hāna Highway bridge and at the stream estuary to collect and identify fish, crustaceans, and mollusks.

Results

Because Waiohonu Stream is intermittent in the vicinity of the bridge at Hāna Highway, no aquatic biota were observed except for flying adult dragonflies. The area around the bridge, and for a significant distance upstream is normally dry and only supports transient aquatic life. No Federally endangered or Federal listed Species of Concern were observed during these surveys.

Fish, Crustacean, and Mollusk Results

Downstream of the Waiohonu Stream bridge, a large estuary is formed that contains only native aquatic biota. Because of recent rains, the estuary had surface salinities of 6 ppt, but the fauna observed while snorkeling indicates this area is likely more brackish than fresh during most of the year. The only fish observed were *Eleotris sandwicensis* and *Kuhlia xenura*, both of which are highly tolerant to brackish waters, and are native species. Although not observed during our surveys, mullets such as the native *Mugil cephalus* are

undoubtedly also found within this estuary. This is because waves were often observed sweeping over the terminal stream gravel bar at the ocean, and this would allow easy access for any estuarine organism. The native mussel *Isognomon californicum* densely covered the rock walls of the Waiohonu Stream estuary, while the endemic *Theodoxus cariosus* was occasionally observed among the thick masses of mussels. *Theodoxus cariosus* is relatively uncommon and typically only found in areas with high water quality and few or no alien species. No native brackish or freshwater crustaceans were observed in the estuary area, although one small marine crab was observed but we were unable to capture and therefore identify the crab.

Table 1. Results of Hawaii Biological Survey, Bishop Museum surveys conducted in December 2001 for aquatic species at Waiohonu Stream, Hāna Highway bridge crossing area.

Taxon	Estuary Pool	Waiohonu Bridge	Geographic Status
Fish			
Eleotris sandwicensis	X		Endemic
Kuhlia xenura	X		Endemic
Mollusks			
Isognomon californicum	X		Endemic
Theodoxus cariosus	X		Endemic
Aquatic Insects			
Anisoptera (Dragonflies)			
Aeschnidae			
Anax strenuus	X		Endemic
Libellulidae			
Orthemis ferruginea	X	X	Introduced
Pantala flavescens	X	X	Indigenous

Aquatic Insect Results

A total of three species of aquatic insects were collected during this survey (Table 1). The aquatic insects collected are typical of those found along intermittent stream channels, with adult dragonflies dominating the insect fauna in this area. Immature aquatic insects and other adult aquatic insects were not found in Waiohonu Stream, reflecting the intermittent nature of this stream at lower elevations.

Recommendations

Waiohonu Stream in the area of the Hāna Highway is intermittent and contained no native stream biota such as fish, aquatic insects, mollusks, or crustaceans. However, a permanent estuary pool likely fed by some groundwater seepage or intermittent stream flow, and ocean water from wave action contained only native species, several of which are relatively uncommon and only found in high quality aquatic habitats. The stream estuary area is significant in that no alien aquatic species were observed, which is now very unusual in the Hawaiian Islands.

If proper construction practices are used, no impacts to native stream biota should occur as the result of construction during the proposed Waiohonu bridge replacement project. Best management practices should be employed during construction to prevent soil erosion into the highly pristine estuary area and nearshore ocean areas.

APPENDIX F

Drainage Report

Sato & Associates, Inc.

August 2002

DRAINAGE REPORT

FOR THE

WAIOHONU BRIDGE REPLACEMENT

HANA HIGHWAY HISTORIC DISTRICT, HANA, MAUI, HAWAII

TAX MAP KEY (2) 1-4-011: VARIOUS & 1-4-012 VARIOUS

Prepared for:

County of Maui
Department of Public Works and Waste Management

Prepared by:

Sato & Associates, Inc.
2046 South King Street
Honolulu, Hawaii, 96826

Revised September 3, 2002

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INTRODUCTION

Project Description

The County of Maui is proposing to replace the existing Waiohonu Bridge, which crosses the Waiohonu Stream. The bridge is located about 3 miles south of Hana, Maui, along the historic Hana Highway (Hwy 31). Private property lots are located both on the upstream and downstream sides of the bridge (and on both sides of the stream). A new bridge will replace the existing structure, excluding the abutments and some of the piers. The existing Waiohonu Bridge consists of one CRM and three concrete piers, spanning 18.5 to 20 feet apart. It spans 97'-6" feet across the stream. The proposed bridge will span 97'-6" feet over the existing abutments. It will have one 12-foot travel lane with two-2 feet shoulders, for an overall width of 16 feet. Two CRM piers, centered at a 40 feet spacing, will support the new bridge. The piers, railing, and overall appearance of the bridge will be built to match the characteristics of the old structure.

Purpose and Scope

Overall design objective for the replacement bridge is intended to minimize the environmental impact to the stream environment, to enhance the bridge hydraulic capacity, and to preserve the characteristics of the existing bridge for its historical value. For this reason, the existing abutments will be retained and reused for the new bridge and the overall bridge appearance will be retained. The scope of this project does not include other improvements to the roadway or approach. Hydrologic, hydraulic, and scour calculations are shown in this report for the existing and proposed conditions.

EXISTING CONDITIONS

Watershed Conditions

The Waiohonu stream is fed by a 5.2 sq. mi. (3300 Acres) watershed, located on the east slope of the Haleakala Mountain. The terrain at the watershed is mostly forested and rocky, the upper watershed soil is classified as rough mountainous land and well drained to poorly drained Hydrandepts-Tropaquads (weathered volcanic ash). The soils around the bridge area are classified as Makaalae "extremely stony" silty clay. The stream's slope varies from steep at the upper reach to moderate along the main stem. Elevation difference between the upper watershed and the bridge is roughly 6900 feet. Waiohonu Stream is perennial.

Designated Flood Hazard

According to the 1981 Flood Insurance Rate Map (FIRM) for the County of Maui, the stream area at the bridge crossing is designated as Zone "A". The FIRM defines zone "A" as "areas within limits of the 100 year flood boundary".

Stream Stability

Stream Characteristics & Geomorphology

Waiohonu Stream is a narrow stream that generally follows its valley alignment. In the area of the bridge, the stream channel banks are approximately 3:1 to 5:1 horizontal to vertical slope. The streambed is somewhat rocky on the upstream side with rocks that vary in size from pebble to 2' diameter rocks. These rocks scatter the bedrock bottom of the stream. The downstream side is currently clear of rocks, which suggests higher flow velocities. The streambed on the downstream side is rugged basalt bedrock with small natural pools. The stream channel walls are highly vegetated and end at a highly developed and vegetated banks. There are no visible signs of significant bank failure/erosion or lateral expansion. Figure 1 summarizes the geomorphic characteristics of the Stream.

Lateral Stability

Waiohonu Stream's sinuousity is dictated by the natural valley alignment. The bends of the stream show minimal to no point bar development and the channel width remains consistent. Field inspection revealed trees along the edges of the steep banks with no trees that appeared to be affected by bank erosion. This indicates that in general, there is good lateral stability.

Vertical Stability

The Waiohonu Stream bed in the vicinity of the bridge is primarily bedrock, with occasional cobbles and boulders. There is no apparent buildup of sediment near the bridge, which can be attributed to steady stream flows with no abstractions. A large scour hole (approx. 4,000 CY) is located below a waterfall, about 1,700 feet upstream of the bridge. A 70' waterfall is located 200' downstream from the bridge. The composition of the streambed material indicates that the stream has high vertical stability.

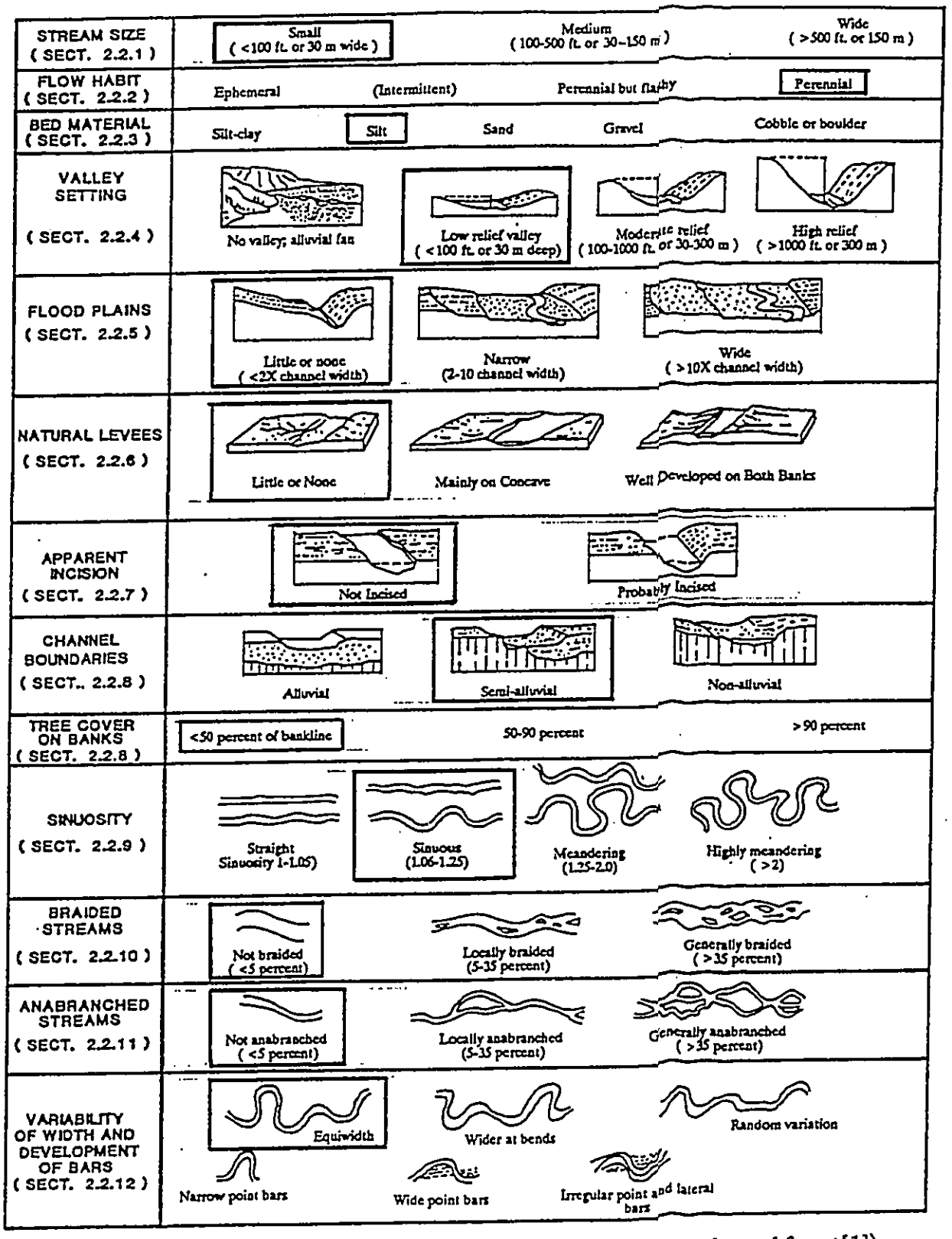


Figure 1. Geomorphic factors that affect stream stability (Adapted from [1]).

Figure 1

Land Use

The land surrounding the Waiohonu Stream consists of homes on the northwest, southwest and southeast sides of the bridge. The lot northeast of the bridge (L.C. Lw, 5.60 acres) has no structure close to the bridge. The vegetation, rock, and bedrock in the stream and banks maintain erosion to modest or slight levels. These conditions and restraints point to very slow change in the stream geomorphology due to development.

Conclusions on Overall Stability

Waiohonu Stream exhibits good overall stability. The stream is primarily carved in the basalt bedrock with occasional cobbles and boulders, has fairly uniform width and shows no signs of lateral sediment migration.

Stream Hydrologic Calculations

Watershed Analysis and Determination:

The watersheds used to determined storm runoff flows within the project limits are based upon the United States Geologic Services (USGS) contour maps and aerial and topographic survey maps prepared for the project. These maps indicate topographic features and elevations, gulches, and some man made features. These maps were used to determine existing terrain and watersheds. See Exhibit C - Watershed Map. This information was then used with other information to calculate storm runoff flows.

The watershed studied in this report is ungaged. Input parameters for the Synthetic Unit Hydrograph (SUH) are the curve number, point rainfall, area of the watershed, the length of the watershed and slope. The Curve Number (CN) characterizes the watershed in terms of its soil cover complex, which is a function of land use, hydraulic soil group, hydraulic condition, and antecedent moisture condition. The point rainfall of a watershed is read from the appropriate rainfall map. Where a watershed crosses several point rainfall depths, a weighted point rainfall is calculated. The equations and criteria for calculations can be found below. The calculations can be found in Appendix A - Hydrology.

The peak runoff determined at the bridge for the 100-year 24-hour storm was 17,000 cubic feet per second (cfs). The peak runoff for the 500-year 24-hour storm is derived from the 100-year calculation and was determined to be 28,900 cfs. Appendix A, Stream Hydrologic Calculations, contain the hydrologic calculations for these storm events.

The peak runoff for a recurrence interval of 500 years was determined following FHWA guidelines. FHWA uses a peak flow of the 500-year storm to be 1.7 times the peak flow of the 100 year storm.

Hydrology calculations for the watershed upstream of the bridge were made using HEC-HMS software (Corps Of Engineers), utilizing the SCS (NRCS) loss rate method for estimating runoff. This method is used as required by the County Of Maui to determine flows for drainage areas greater than 100 acres. The storm used for the HEC-RAS model was the "SCS Hypothetical Storm, Type III".

Hydrologic Criteria

The hydrologic criteria used in this report is based on the "Design Criteria for Highway Drainage," State of Hawaii, Department of Transportation, Highways Division, dated December 5, 1985. The following is a list of the hydrologic criteria used:

1. *Design Storm Recurrence Interval*

   Tm = 100 years for Waiohonu Stream

   Tm = 500 years for Waiohonu Stream

2. Rainfall Intensity

   i = 20 in./ 24 hr. for Tm = 100 years (from Rainfall-Frequency Atlas of Hawaii Islands, Technical Paper No. 43, U.S. Department of Commerce Weather Bureau, 1962)

3. Bridge Drainage Area= 5.22 Sq. Mi, or 3,340 Acres, determined from USGS Topographic map

4. Determination of Runoff Quantity:

   To determine runoff quantities the watershed was divided into three subbasins, according to land type.

   Subbasin #1: Hydrandepts-Tropaquads (rHT) and Rough Mountinoud Assoc. (rRT), Upper Watershed
   Subbasin #2: Hana, Very Stony, Silty Clay Loam, 3-25% (HKLD)
   Subbasin #3: Makaalae Extremely Stony Silty Clay, 7-25% (MJD)

   The table below summarizes the data collected and used in the model:

Variable	Subbasin #1	Subbasin #2	Subbasin #3
Area (Sq. Mi)	4.88	0.15	0.20
Curve Number: CN Determined from SCS, Soils Survey of the State of Hawaii, 1972 and TR 55	83	30	55
Time of Concentration (hrs): T_C is Determined using the combined Time Of Travel of "Sheet Flow", "Shallow Concentrated Flow" and "Open Channel"	1.17	0.03	0.04
Lag Time (hrs)= T_C*0.6	0.702	0.018	0.024

Existing Conditions, Stream Hydraulic Calculations

The existing bridge and stream channel hydraulics were analyzed using the HEC-RAS software. Flows were obtained from the hydrologic model (HEC_HMS Software) and incorporated into this software for the 100-year 24-hour storm and the 500-year 24-hour storm events. The Manning n value (see below) was determined from photos and site visits. Two manning values per cross section were determined, namely the channel, which is rocky and smooth and the sideslopes, which are usually heavily vegetated.

It was found that the water overtops the bridge for both the 500 and 100-year storms. In addition, the existing bridge multi pier configuration may restrict flow considerably by catching on branched and other debris. To find the flows that can be passed through the existing bridge, it was also modeled for higher frequency storms. According to the hydrologic and hydraulic models, the bridge passes the 50-year storm if no obstructions, such as branches or silt buildup restrict the flows. This matches eye accounts of regular bridge overtopping. The calculated water surface profiles for the existing condition storm events are found in Appendix B, – Stream Hydraulics.

PROPOSED CONDITIONS

Stream Hydraulic Calculations

The proposed bridge and stream channel were also analyzed using the HEC-RAS software for the 100 year 24-hour storm and the 500 year 24-hour storm events. All the parameters were retained from the existing bridge model, except the new bridge data. **The new bridge configuration, which uses two, instead of four piers does not improve the hydraulic condition in any significant way.** However, it is reasonable to expect improvements in flows due to reduced obstructions that may be caused by debris that snag on the piers. The water surface profile is shown in Figure 3. It compares the three storms and shows a hydraulic 4-foot jump, created by the bridge for the 100 and

500-year storms. It should be noted that the flood dynamics of the surrounding area may be different than this hydraulic jump elevation, but water will overtop the bridge.

Hydraulic Calculations

Manning's equation was utilized by HEC-RAS for hydraulic calculations:

MANNING'S EQUATION

$$Q = A \frac{1.49}{n} R^{2/3} S^{1/2}$$

Q = Flow (cfs)
A = Area (ft^2)
n = Roughness Coefficient
R = Hydraulic Radius (ft)
S = Slope (ft/ft)

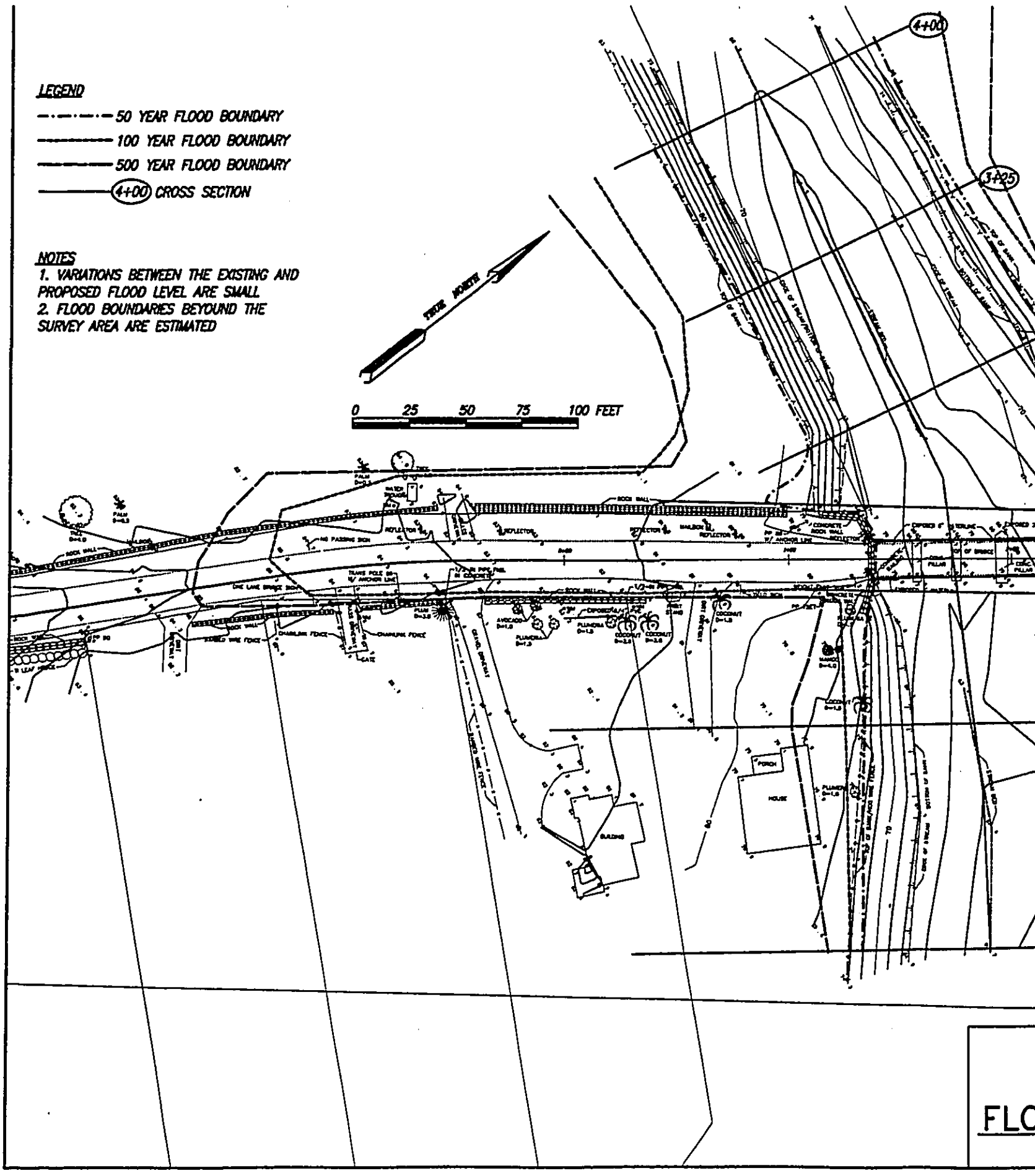
The cross section were divided to channel and overbank with distinct n value, according to field observations. The bridge layout was configured according to the pier and deck size and elevations. See appendix B.

LEGEND

- 50 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD BOUNDARY
- 500 YEAR FLOOD BOUNDARY
- 4+00 CROSS SECTION

NOTES

1. VARIATIONS BETWEEN THE EXISTING AND PROPOSED FLOOD LEVEL ARE SMALL
2. FLOOD BOUNDARIES BEYOUND THE SURVEY AREA ARE ESTIMATED



FLO

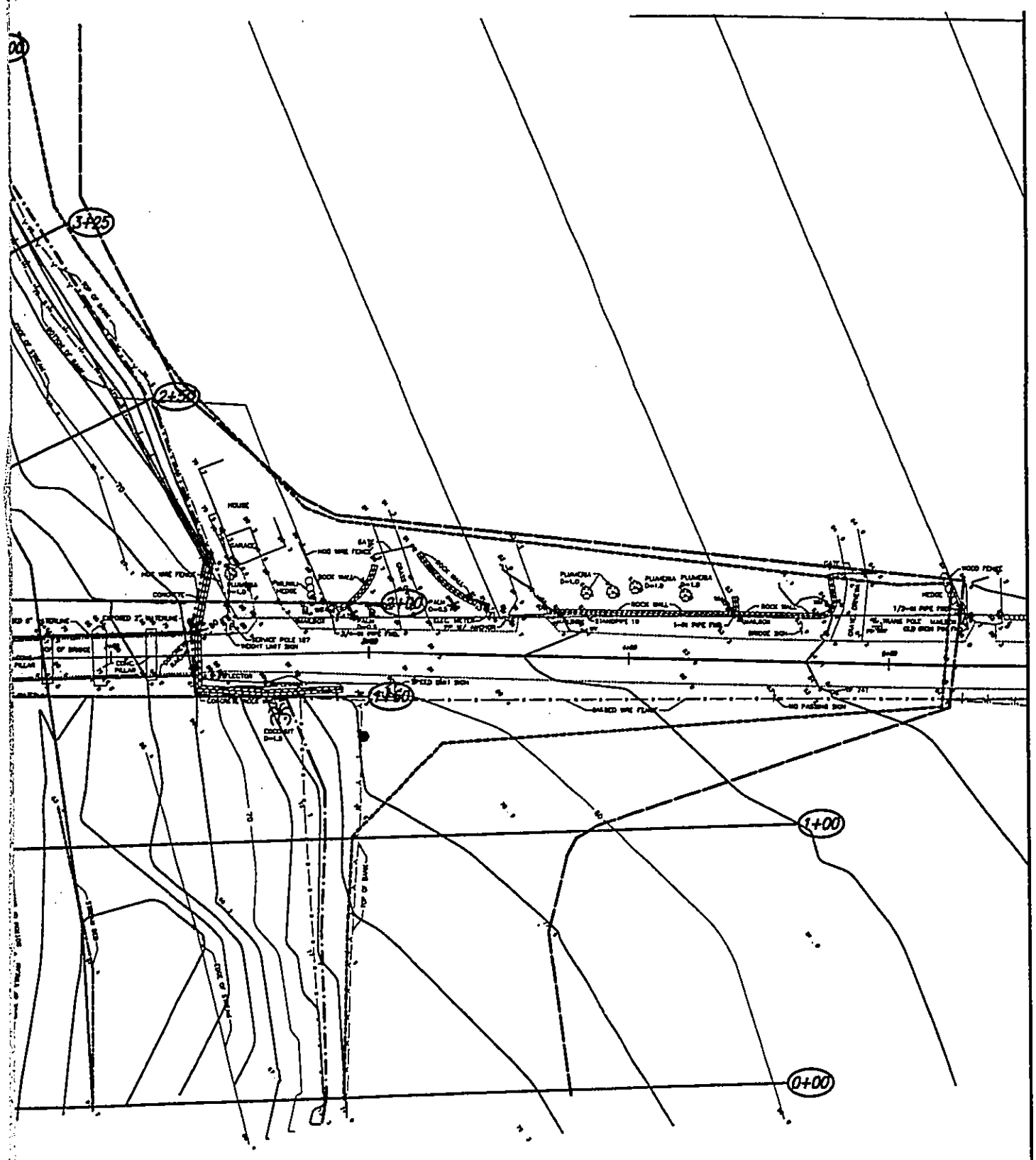


FIGURE 2
FLOOD BOUNDARY MAP

SATO AND ASSOCIATES, INC.
CONSULTING ENGINEERS •CIVIL & STRUCTURAL
HONOLULU, OAHU, HAWAII •WAILUKU, MAUI, HAWAII

DATE: 9/3/2002

SCALE: 1"=2000'

WAIOHONU BRIDGE

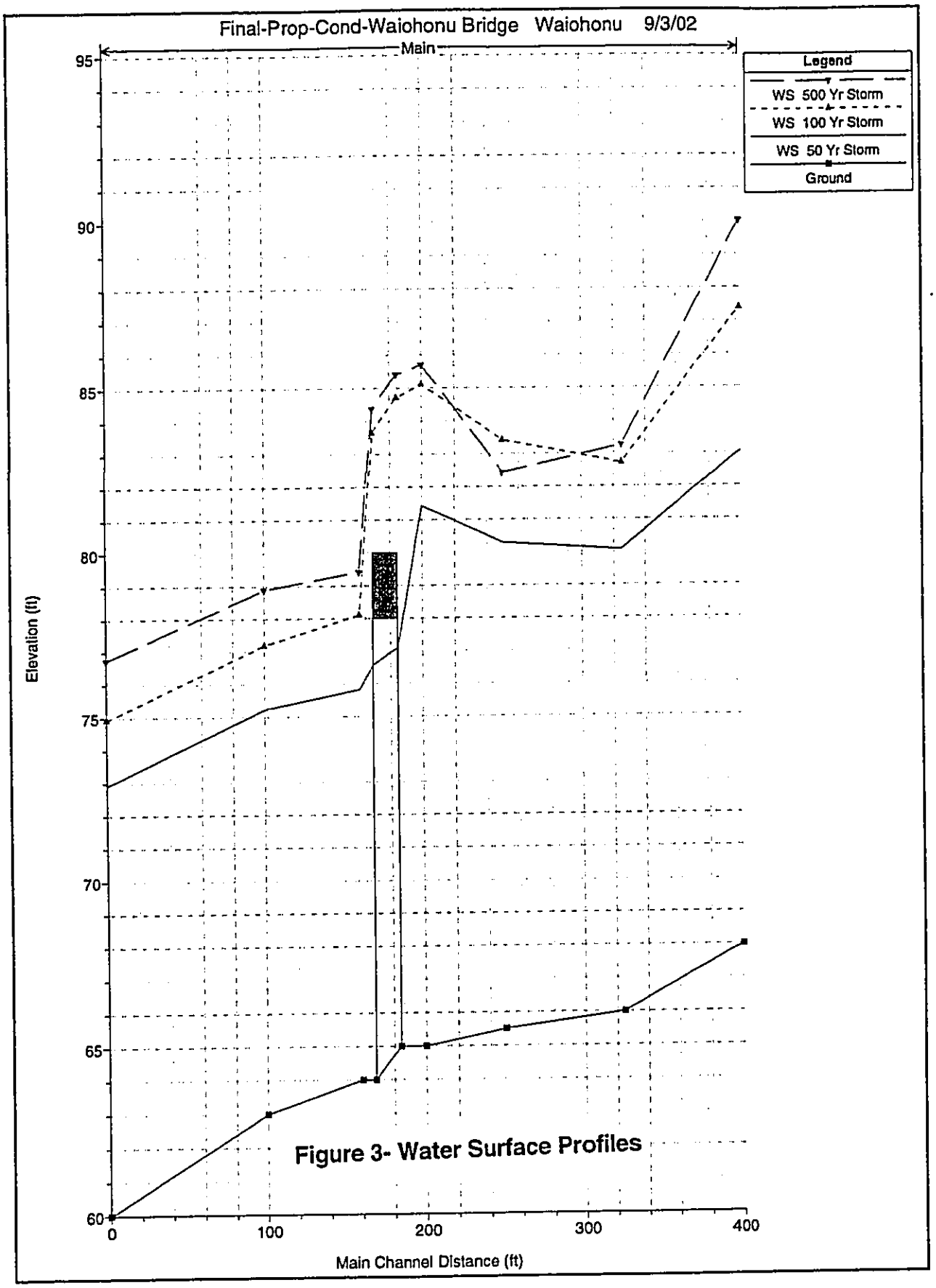


Figure 3- Water Surface Profiles

Scour Calculations

Borings at the site indicate a basalt rock layer that lines the channel to a great depth. The basalt rock layer minimizes the scour significantly. The estimated scour calculations for the proposed conditions for the 100-year 24-hour storm and 500-year 24-hour storm are found below. Because of the basalt layer, scour for the 100-year and 500 year storms, at the abutments and piers are marginal.

Scour Criteria

The scour calculations found in this report were calculated using the HEC-RAS software. The software generated the estimated scour for the proposed conditions. The HEC-RAS software computes the scour at the bridge using methods found in the Hydraulic Engineering Circular No. 18 (HEC No. 18, FHWA, 1995). Contraction scour and local scour at the abutments were computed. A D_{50} of 10 mm or .033 ft. was assumed for the contraction scour calculations. The scour estimated in the calculations does not take into account protection such as riprap or existing features such as trees. The equations used to determine the local scour at the abutments and piers are not based on field conditions. The following are the equations used to estimate the scour at the bridge from HEC No. 18.

Laursen's equation to determine critical velocity:

$$V_c = 10.95\, y_1^{1/6}\, D_{50}^{1/3}$$

Where:

V_c = Critical velocity above which material of size D50 and smaller will be transported, ft/s

y_1 = Average depth of flow in the main channel or overbank area at the approach section, ft

D_{50} = Bed material particle size in a mixture of which 50 % are smaller, ft

For velocities at the approach section less than the critical velocity, clear-water contraction scour is assumed. For velocities at the approach section greater than the critical velocity, live-bed contraction scour is assumed.

Live-Bed Contraction Scour:

$$y_2 = y_1 (Q_2/Q_1)^{6/7} (W_1/W_2)^{k1}$$

$$y_s = y_2 - y_0$$

Where y_s = Average depth of contraction scour, ft

y_2 = Average depth after scour in the contracted section, ft

y_1 = Average depth in the main channel or floodplain at the approach section, ft

y_0 = Average depth in the main channel or floodplain at the contracted section before scour, ft

Q_1 = Flow at the approach section, cfs

Q_2 = Flow at the contracted section, cfs

W_1 = Bottom width (Top width acceptable) at approach section

W_2 = Bottom width (Top width acceptable) at contracted section

k_1 = Exponent for mode of bed material transport

Froehlich's Equation for Local Scour at Abutments:

$$y_s = 2.27 K_1 K_2 (L')^{0.43} y_a^{0.57} Fr^{0.61} + y_a$$

Where: y_s = Scour depth in feet

K_1 = Correction factor for abutment shape

K_2 = Correction factor for angle of attack

L' = Length of abutment (embankment) projected normal to flow, ft

y_a = Average depth of flow on the approach section, ft

Fr = Froude number of flow on the approach section

SUMMARY AND CONCLUSION

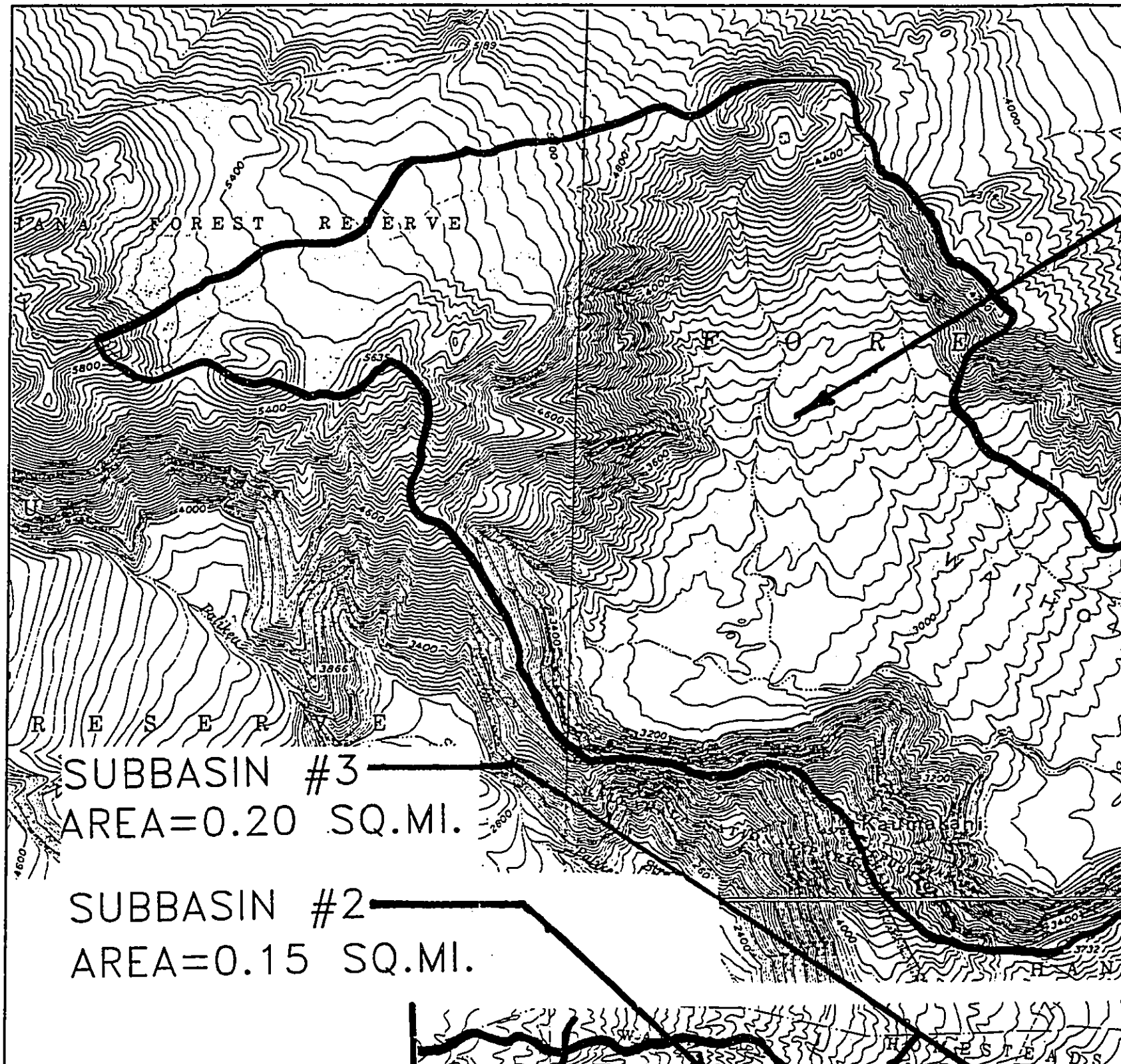
The County Of Maui plans to replace the Waiohonu Bridge while preserving its historic characteristics. The new design will retain the old bridge general design and size.

Both the proposed and existing bridge configurations were analyzed to determine adverse flow conditions. 100 and 500 exceedence probability storm events were analyzed, as required by the County of Maui. It was shown that flows under the existing and proposed conditions are greater than the bridge capacity for the given storms, but the flow conditions will improve with the new design. With no flow abstractions such as branches or silt buildup, the new bridge will be able to handle a 50-year storm event.

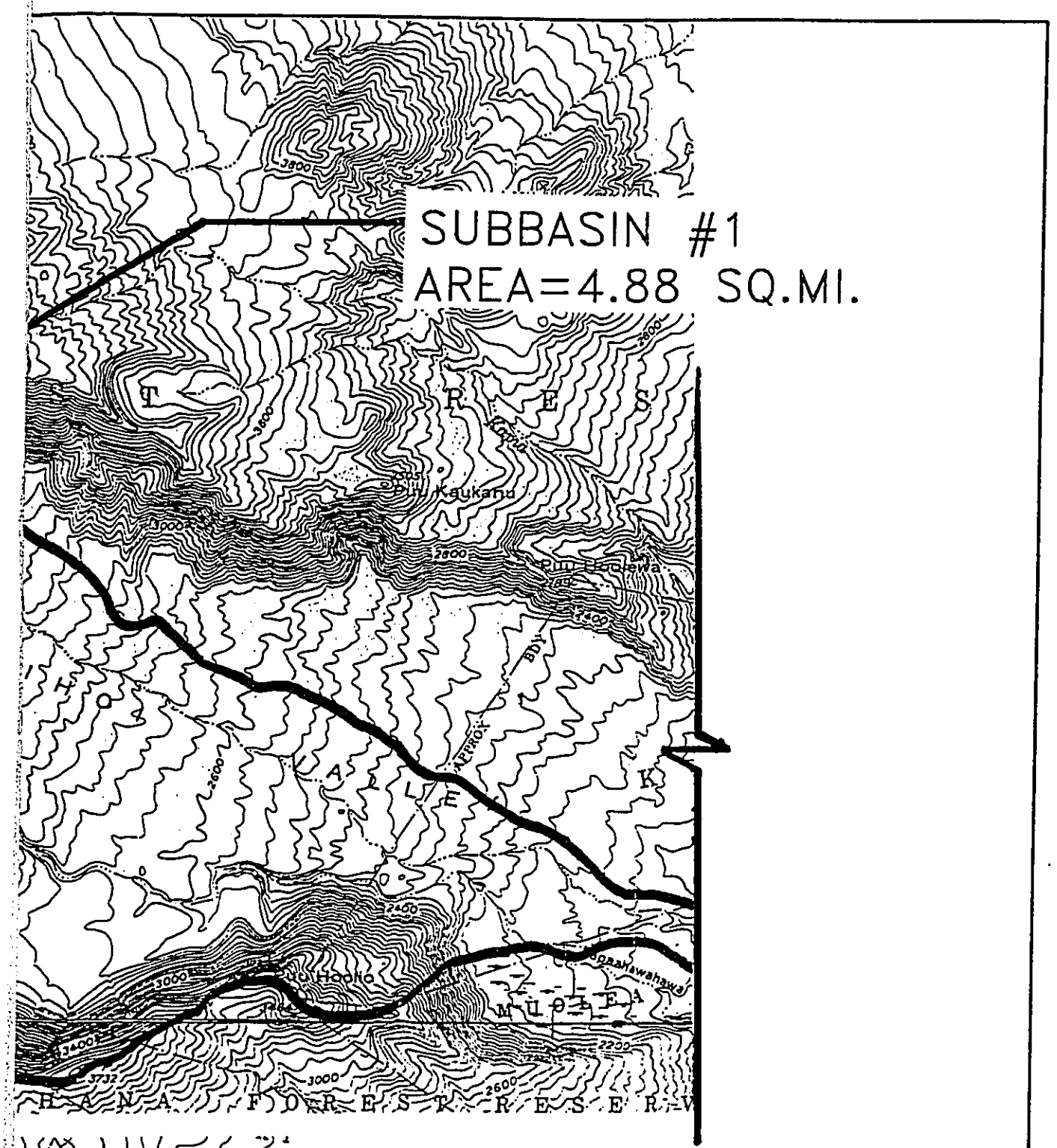
Scour analyses shows the basalt streambed limits scouring on the bridge to a marginal level.

APPENDIX A: HYDROLOGY

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED



TRIBUTARY AREA MAP

SATO AND ASSOCIATES, INC.
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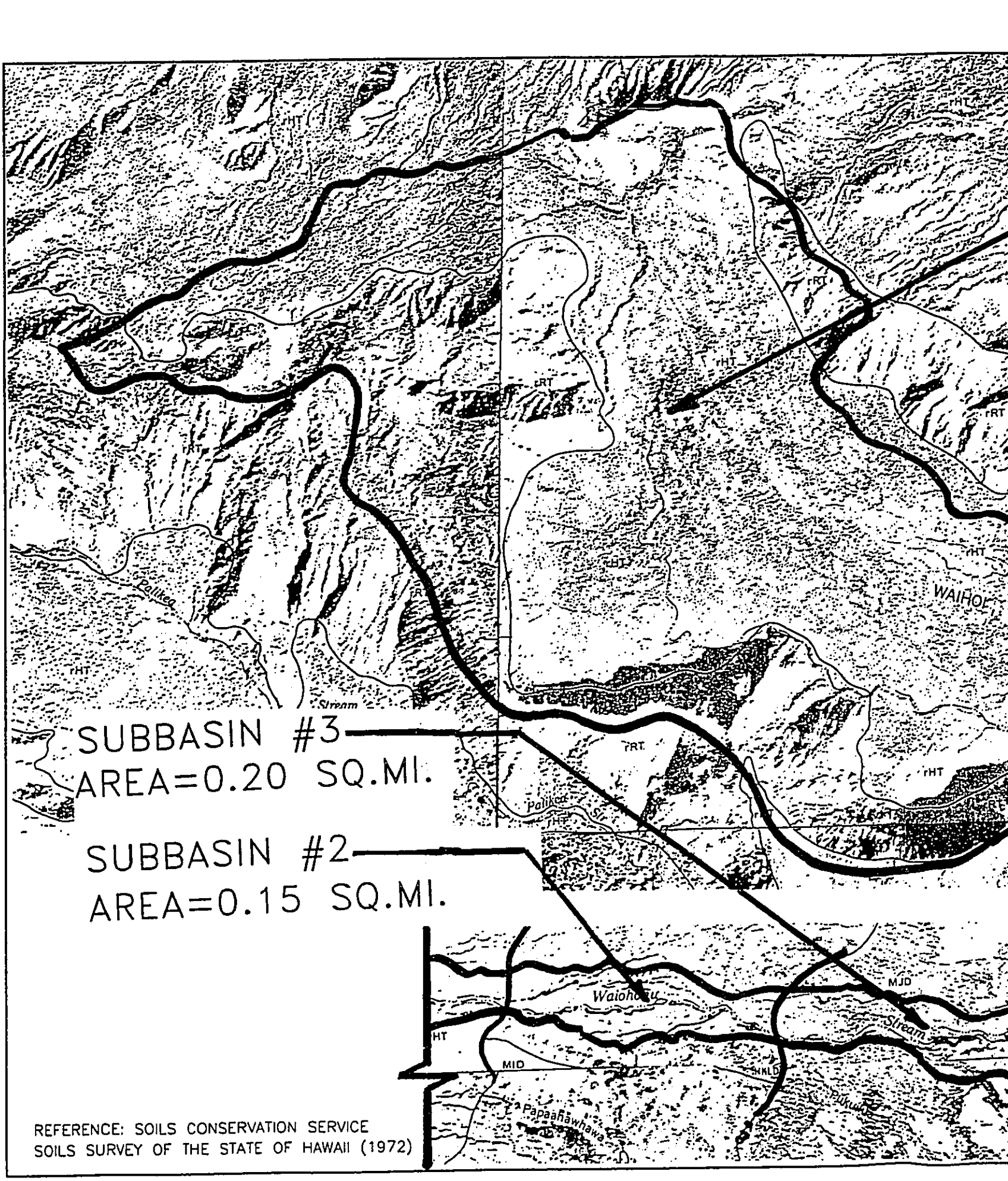
HONOLULU, OAHU, HAWAII • WAILUKU, MAUI, HAWAII

DATE: 1/21/2002	WAIOHONU BRIDGE
SCALE: 1"=2000'	



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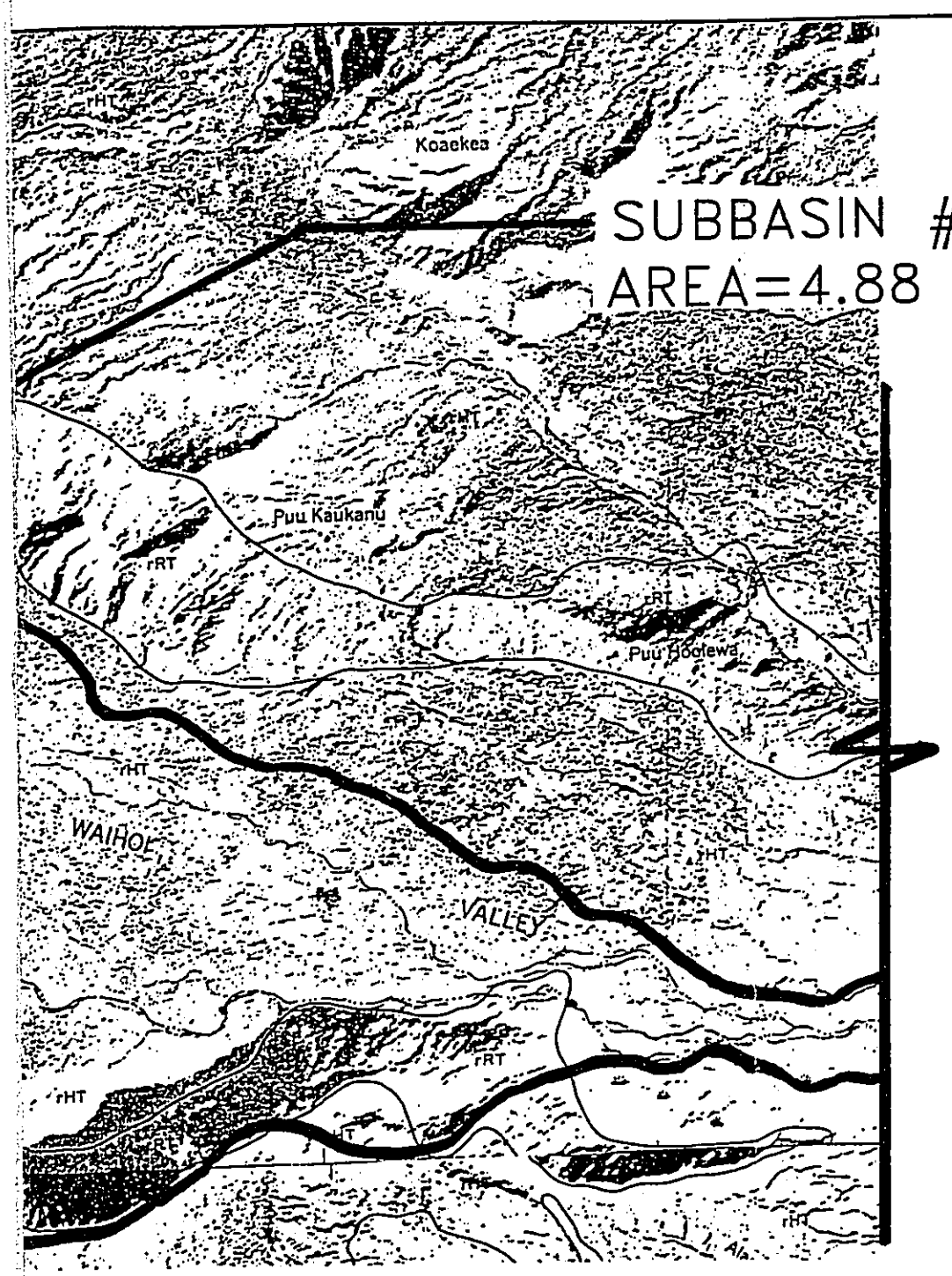
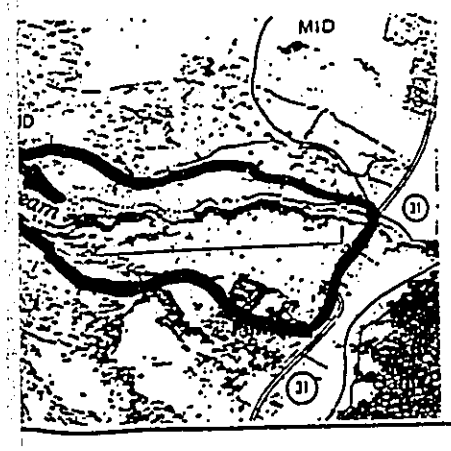


SUBBASIN #1
AREA=4.88 SQ.MI.



NORTH

SCS SOILS MAP

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CONSULTING ENGINEERS • CIVIL & STRUCTURAL
HONOLULU, OAHU, HAWAII • WAILUKU, MAUI, HAWAII

DATE: 1/21/2002	WAIOHONU BRIDGE
SCALE: 1"=2000'	

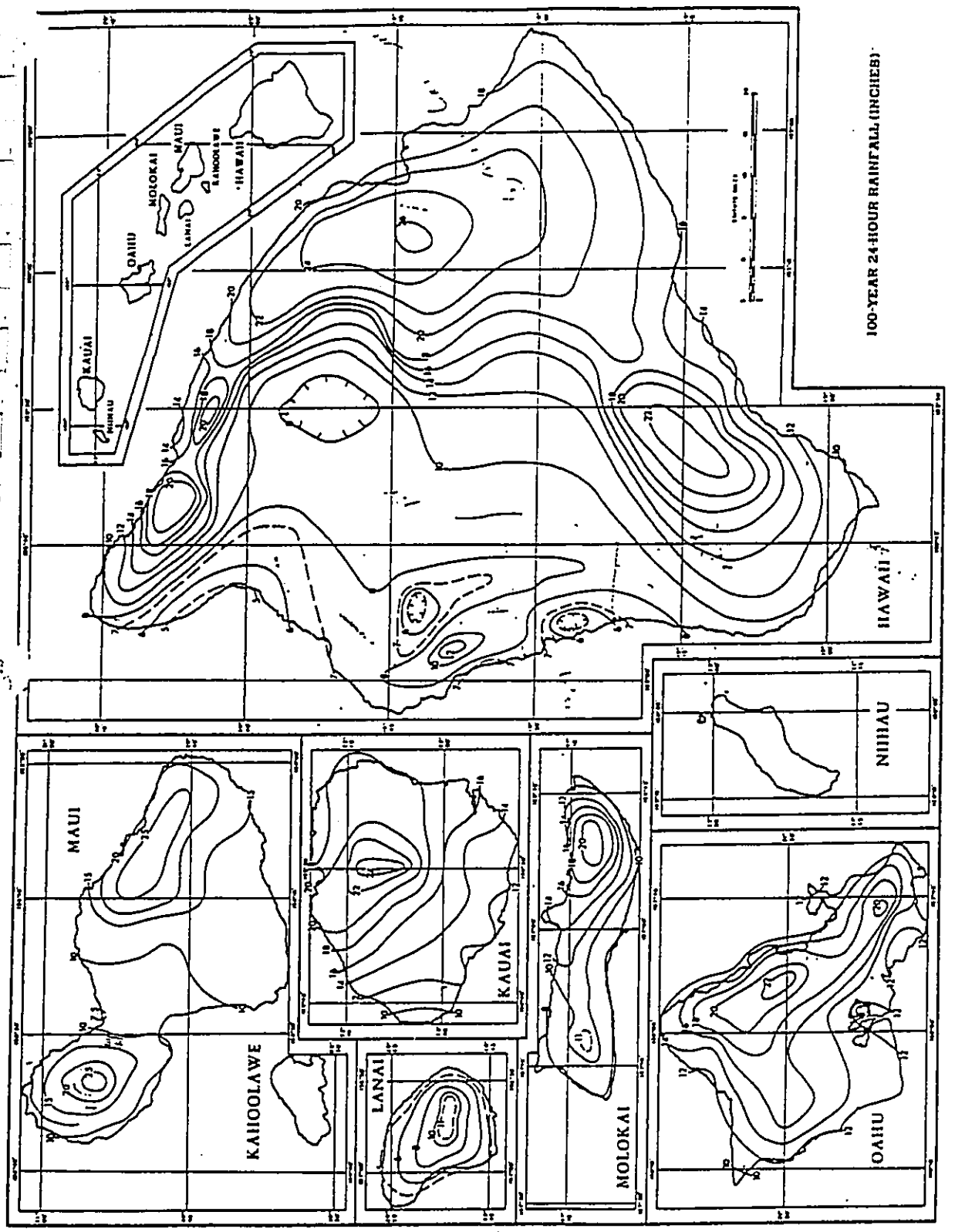


FIGURE 56.—100-yr. 24-hr. rainfall (in.)

Sato & Associates, Inc.
Consulting Engineers

Sheet: ____ Of: ____
By: SJA Date: ____
Chkd. by: ____ Date: 12/18

PROJECT: Job # M0111

Waiohonu Stream

Curve Number (CN) Designation:

Subbasin I, Group D, composite CN = 2.92 mi² = woods, good con
CN = 79
1.955 mi² = rough mount.
CN = 90

$$\text{Comp. } CN = \frac{(79 \cdot 2.92) + (90 \cdot 1.955)}{4.875} = 83$$

Subbasin II woods, good cond. group A - CN = 30

Subbasin III " " " , group B - CN = 55

Rainfall
Taken from Rainfall Frequency Atlas

1-hr, 100 yr. Storm - 5.5 in
1-hr, 50 yr. - 5 in

$$S = \frac{1000}{CN} - 10$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

Tc, Subbasin I

Sheet flow: $T_t = \frac{0.007 (nL)^{0.8}}{\sqrt{P_2}\, S^{0.4}}$ ✓Eq. 3-3, TR55

where: n = Manning = 0.4
L = length = 300'
P_2 = 2yr 24 hr rainfall = 8 in
S = Slope = 0.4 ft/ft

$$T_t = \frac{0.007 (.4 \cdot 300)^{0.8}}{\sqrt{8} \cdot 0.4^{0.4}} = 0.16 \text{ hr.}$$

Shallow conc. flow #1
Watercourse Slope = (5800 - 5900)/5500 = 0.094 ft/ft
V = 4.9 ft/sec T_t = 8500 ft / (4.9 ft/sec · 3600 sec/hr) = 0.4 hr

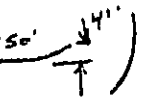
Shallow conc. flow #2:
Slope = (5000 - 3480)/5000 = 0.304 ft/ft
V = 9 ft/sec.
T_t = 5000 ft / (9 · 3600) = 0.15 hr.

DOCUMENT CAPTURED AS RECEIVED

Sato & Associates, Inc.
Consulting Engineers

Sheet: ____ Of: ____
By: SJA Date: ____
Chkd. by: ____ Date: 12/15

PROJECT:

Open channel
Length = 24900 ft
Cross Section - 150' wide, 4' deep, (taken as radius 

)

$R = A/P = 400\ ft^2 / 150\ ft = 2.67\ ft$

$n \approx 0.04$

$S \approx (3480 - 1796)/24900 = 0.068\ ft/ft$

$V = \frac{1.49\, r^{2/3} S^{1/2}}{n} = \frac{1.49 \cdot 2.6^{2/3} \cdot \sqrt{0.068}}{0.04} = 18.3\ ft/sec$

$T_t = 24900/(18.3 \cdot 3600) = 0.38\ hr.$

$T_c = 0.16 + 0.48 + 0.15 + 0.38 = \boxed{1.17\ hr}$ $T_{lag} = 0.6\ T_c = 0.702\ hr$

For Subbasins II & III channel is defined, use only open channel for T_c, use X-Sec. from survey 200 upstream of bridge

Subbasin II :
Length = 5200
Slope = (1796 - 800)/5200 = 0.19 ft/ft
R = A/P = 728.2/101.7 = 7.1 ft
n ≈ 0.04

$V = \frac{1.49 \cdot 7.1^{2/3} \cdot \sqrt{0.19}}{0.04} = 60\ ft/sec$

$T_c = 5200/(60 \cdot 3600) = \boxed{0.03\ hr}$

$T_{lag} = .018\ hr$

Subbasin III
Length = 6100
Slope = (550 - 64)/6100 = 0.12 ft/ft
R = 7.1 ft
n ≈ 0.04

$V = \frac{1.49 \cdot 7.1^{2/3} \cdot \sqrt{0.12}}{0.04} = 46\ ft/sec$

$T_c = 4100/(47 \cdot 3600) = \boxed{0.04\ hr}$ $T_{lag} = 0.024\ hr.$

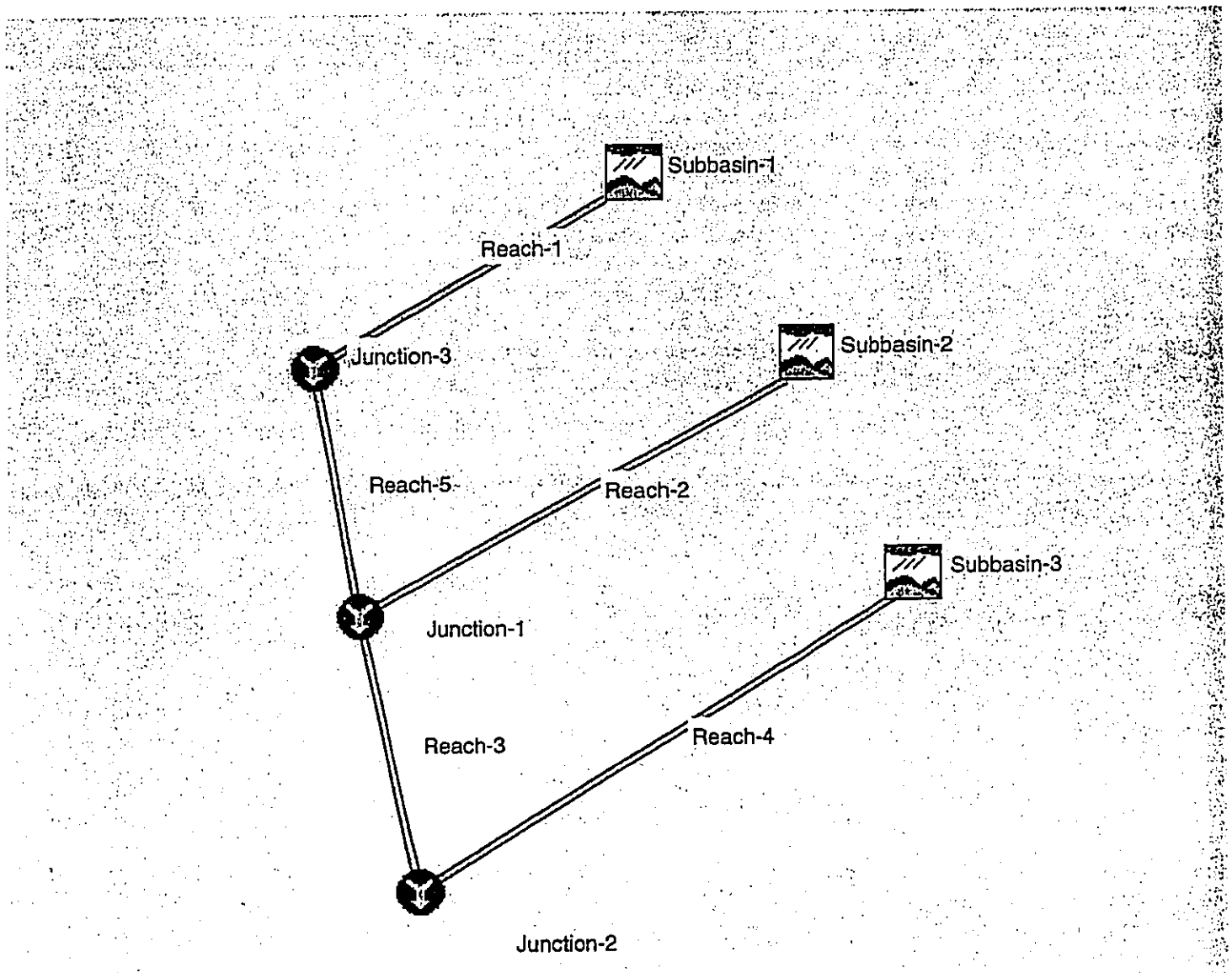
Open Channel Flow Calculation Check

Waiohonu Bridge

Job # M0111
Jeff Argov

Reach	Length	Elev Change	Slope	x-sec.Area	Wet Per.	Hyd. Rad.	Manning's n.	Velocity	Tc or Tt
	(ft)	(ft)	(ft/ft)	(ft^2)	(ft)	(ft)		(ft/sec.)	(hr)
Subbasin #1	24900	1684	0.068	400	150	2.666667	0.04	18.62845	0.371296
Subbasin #2	5200	996	0.192	728.2	101.7	7.160275	0.04	60.56301	0.02385
Subbasin #3	6100	736	0.121	728.2	101.7	7.160275	0.04	48.06771	0.035251

HEC-HMS **Project: Waiohonu Bridge** **Basin Model: Basin 1**



HMS * Summary of Results

Project : Waiohonu Bridge Run Name : Run 15

Start of Run : 01Dec99 0100 Basin Model : Basin 1
End of Run : 02Dec99 0100 Met. Model : 50 Year
Execution Time : 30Aug02 1428 Control Specs : Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-1	17291	01 Dec 99 1345	3522.0	4.875
Reach-1	17291	01 Dec 99 1345	3522.0	4.875
Junction-3	17291	01 Dec 99 1345	3522.0	4.875
Reach-5	17291	01 Dec 99 1345	3522.0	4.875
Subbasin-2	542.67	01 Dec 99 1306	46.394	0.150
Reach-2	542.67	01 Dec 99 1306	46.394	0.150
Junction-1	17373	01 Dec 99 1344	3568.3	5.025
Reach-3	17373	01 Dec 99 1344	3568.3	5.025
Subbasin-3	1197.1	01 Dec 99 1306	99.922	0.195
Reach-4	1197.1	01 Dec 99 1306	99.922	0.195
Junction-2	17536	01 Dec 99 1344	3668.3	5.220

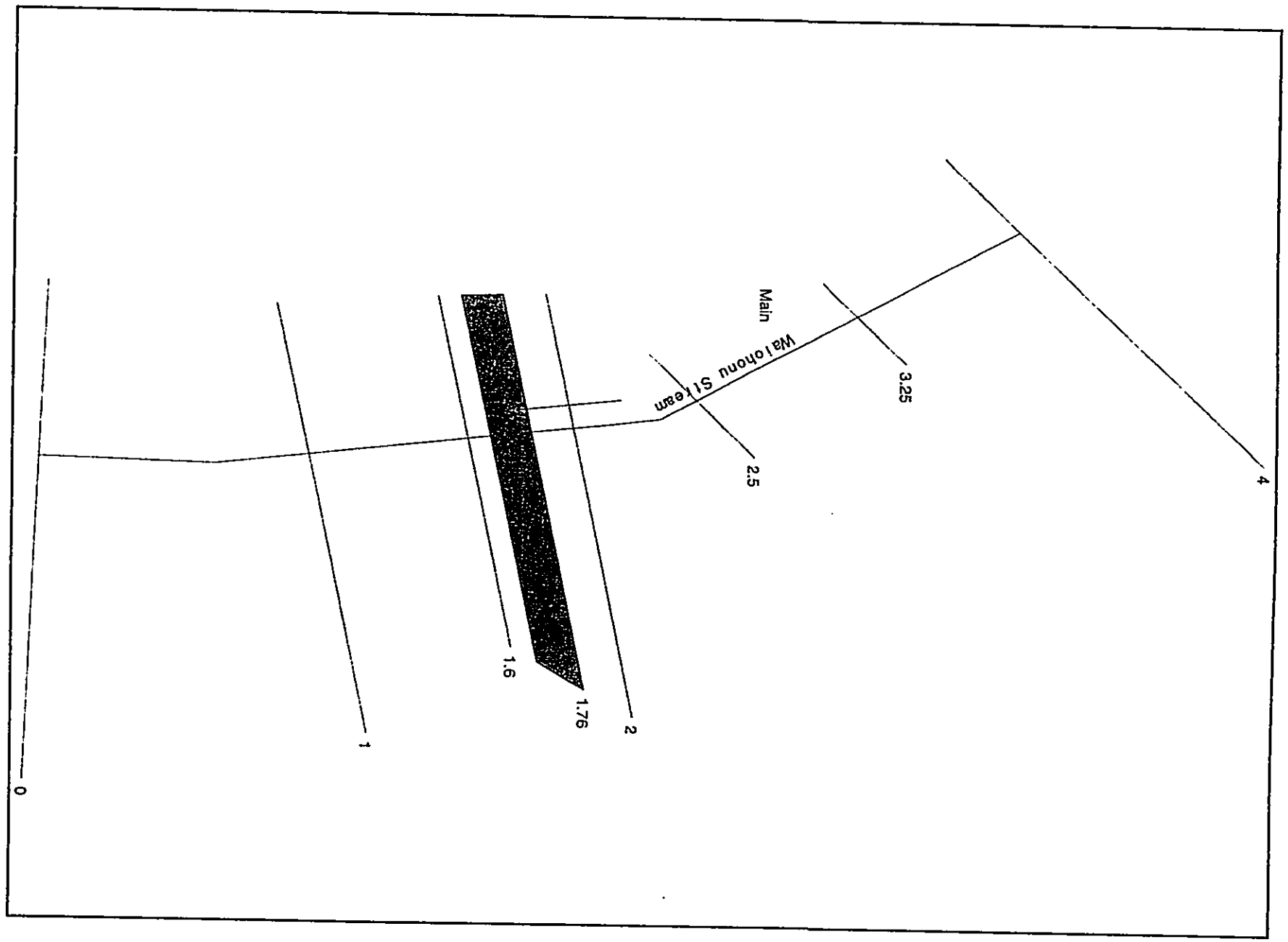
HMS * Summary of Results

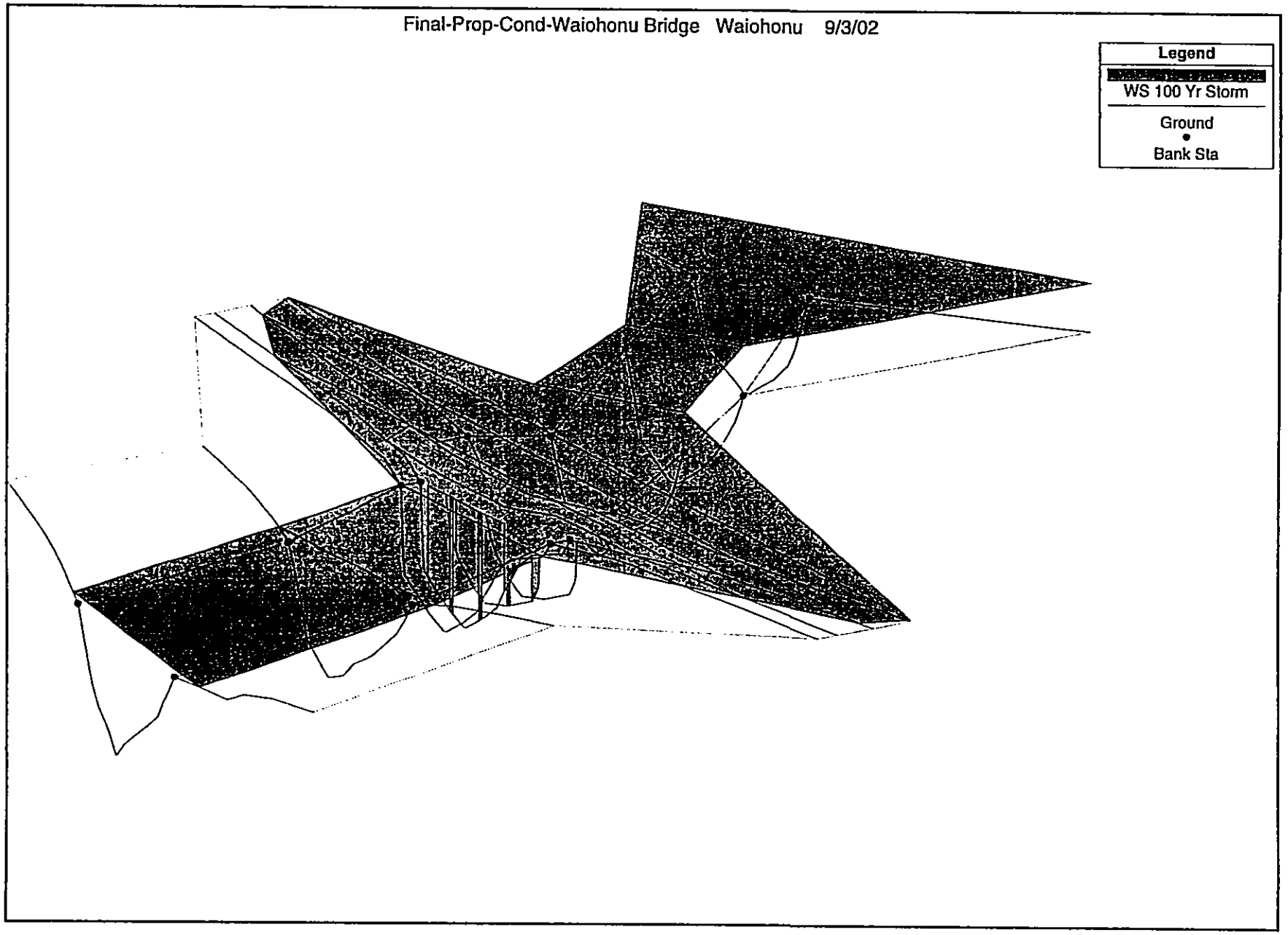
Project : Waiohonu Bridge Run Name : Run 13

Start of Run : 01Dec99 0100 Basin Model : Basin 1
End of Run : 02Dec99 0100 Met. Model : 100-Year
Execution Time : 30Aug02 1201 Control Specs : Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-1	23387	01 Dec 99 1344	4800.8	4.875
Reach-1	23387	01 Dec 99 1344	4800.8	4.875
Junction-3	23387	01 Dec 99 1344	4800.8	4.875
Reach-5	23387	01 Dec 99 1344	4800.8	4.875
Subbasin-2	864.28	01 Dec 99 1306	73.188	0.150
Reach-2	864.28	01 Dec 99 1306	73.188	0.150
Junction-1	23514	01 Dec 99 1344	4874.0	5.025
Reach-3	23514	01 Dec 99 1344	4874.0	5.025
Subbasin-3	1750.9	01 Dec 99 1305	146.51	0.195
Reach-4	1750.9	01 Dec 99 1305	146.51	0.195
Junction-2	23747	01 Dec 99 1344	5020.5	5.220

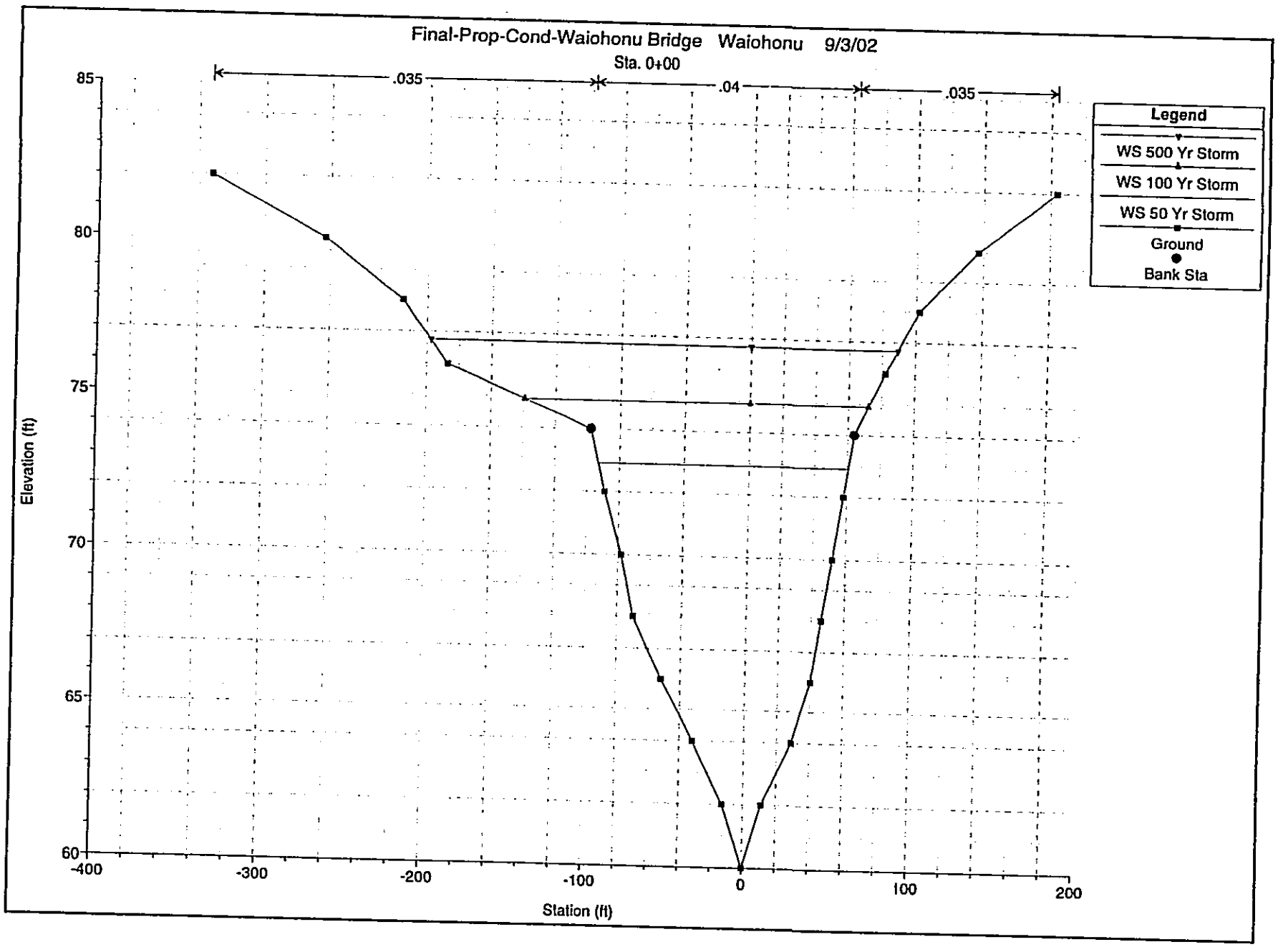
APPENDIX B: HYDRAULICS

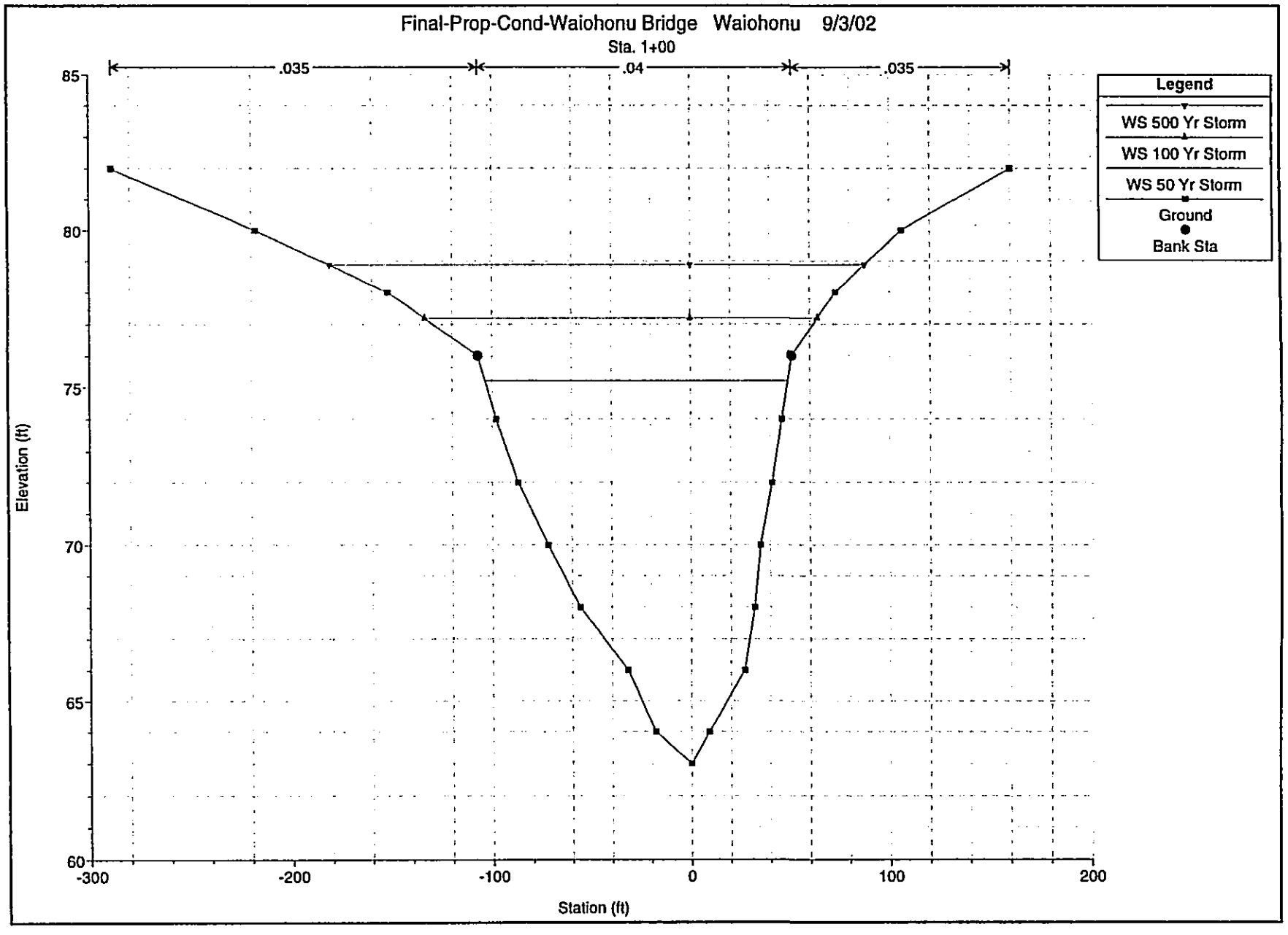

Main
Waiohonu Street
0
1
1.6
1.76
2
2.5
3.25
4

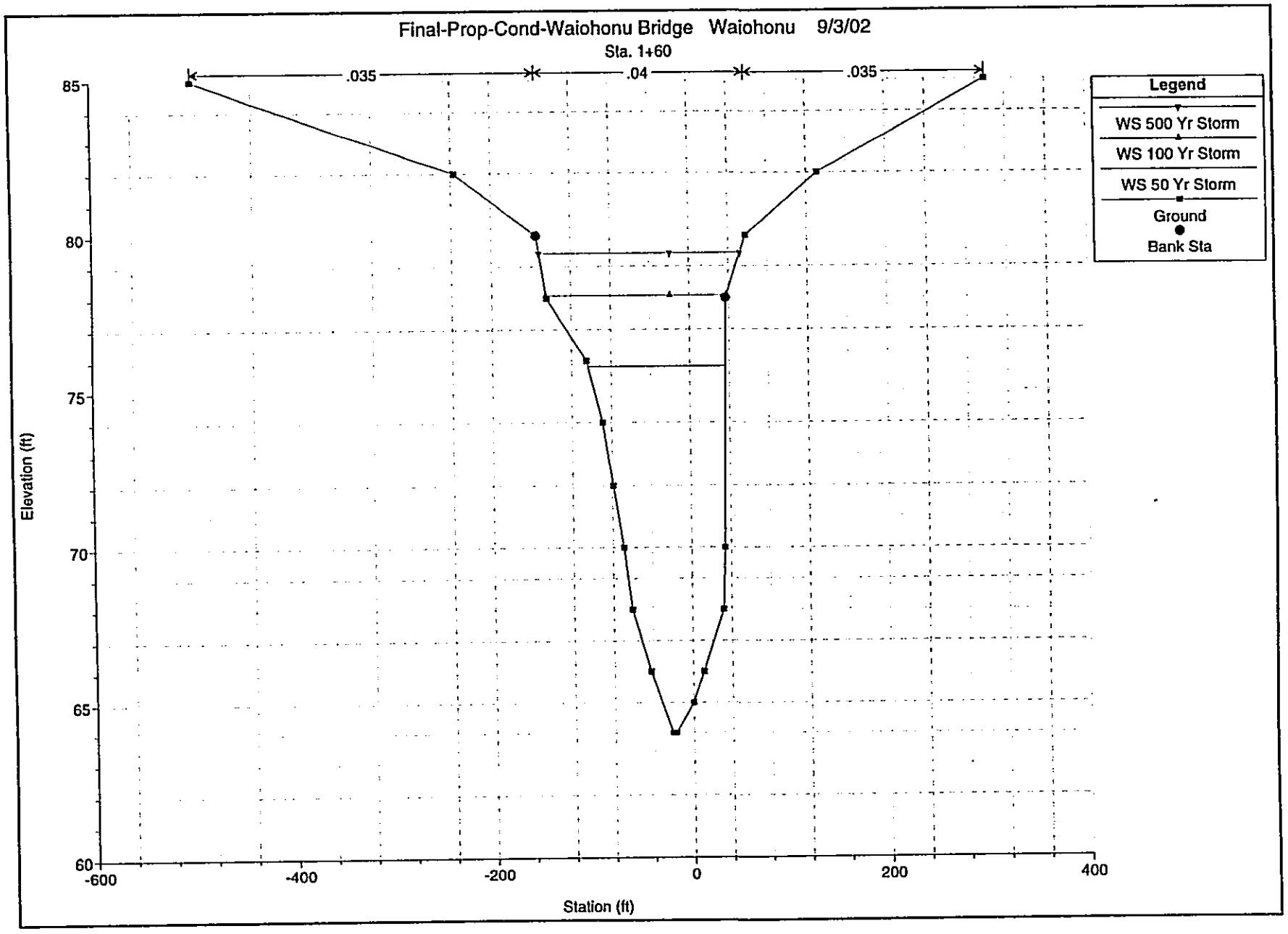

Final-Prop-Cond-Waiohonu Bridge Waiohonu 9/3/02
Legend
WS 100 Yr Storm
Ground
Bank Sta

HEC-RAS Plan: Waiohonu River: Waiohonu Stream Reach: Main

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	[illegible]	50 Yr Storm	17500.00	68.00	83.05	83.05	85.21	0.004808	12.69	1753.02	392.00	0.66
Main	[illegible]	100 Yr Storm	23747.00	68.00	87.39	84.15	88.24	0.001434	8.59	3453.89	392.00	0.38
Main	[illegible]	500 Yr Storm	28900.00	68.00	90.01	84.89	90.72	0.000959	7.78	4482.70	392.00	0.32
[illegible]												
Main	[illegible]	50 Yr Storm	17500.00	66.00	80.07	79.38	84.30	0.008918	16.51	1059.85	104.00	0.91
Main	[illegible]	100 Yr Storm	23747.00	66.00	82.72	81.61	87.63	0.008027	17.78	1335.39	104.00	0.87
Main	[illegible]	500 Yr Storm	28900.00	66.00	83.25	83.25	89.95	0.010482	20.77	1391.30	104.00	1.00
[illegible]												
Main	[illegible]	50 Yr Storm	17500.00	65.50	80.30	78.73	83.43	0.005853	14.23	1244.29	133.00	0.78
Main	[illegible]	100 Yr Storm	23747.00	65.50	83.42	80.90	86.69	0.004503	14.64	1658.45	133.00	0.70
Main	[illegible]	500 Yr Storm	28900.00	65.50	82.42	82.37	88.15	0.008596	19.31	1526.33	133.00	0.96
[illegible]												
Main	[illegible]	50 Yr Storm	17500.00	65.00	81.43	75.93	82.70	0.002211	9.12	2024.87	368.44	0.51
Main	[illegible]	100 Yr Storm	23747.00	65.00	85.11	78.03	85.82	0.001073	7.37	4209.47	800.00	0.35
Main	[illegible]	500 Yr Storm	28900.00	65.00	85.70	80.55	86.53	0.001258	8.17	4678.31	800.00	0.38
[illegible]												
Main	[illegible]	[illegible]	Bridge									
[illegible]												
Main	[illegible]	50 Yr Storm	17500.00	64.00	75.82	75.82	79.76	0.012422	15.92	1099.09	139.75	1.00
Main	[illegible]	100 Yr Storm	23747.00	64.00	78.10	78.10	82.18	0.012493	16.21	1465.45	183.52	1.01
Main	[illegible]	500 Yr Storm	28900.00	64.00	79.42	79.42	83.83	0.011556	16.88	1720.63	203.94	0.99
[illegible]												
Main	[illegible]	50 Yr Storm	17500.00	63.00	75.22	75.22	78.95	0.012354	15.49	1129.77	152.56	1.00
Main	[illegible]	100 Yr Storm	23747.00	63.00	77.18	77.18	81.38	0.010633	16.47	1460.61	197.59	0.96
Main	[illegible]	500 Yr Storm	28900.00	63.00	78.88	78.88	83.04	0.008523	16.54	1851.97	268.80	0.89
[illegible]												
Main	[illegible]	50 Yr Storm	17500.00	60.00	72.92	72.92	76.63	0.012384	15.46	1131.96	153.93	1.00
Main	[illegible]	100 Yr Storm	23747.00	60.00	74.93	74.93	79.05	0.010607	16.31	1474.83	211.51	0.96
Main	[illegible]	500 Yr Storm	28900.00	60.00	76.75	76.75	80.59	0.007950	15.98	1940.76	286.94	0.86


Final-Prop-Cond-Waiohonu Bridge Waiohonu 9/3/02
Sta. 0+00
.035
.04
.035
Legend
WS 500 Yr Storm
WS 100 Yr Storm
WS 50 Yr Storm
Ground
Bank Sta
Elevation (ft)
85
80
75
70
65
60
-400
-300
-200
-100
0
100
200
Station (ft)


Final-Prop-Cond-Waiohonu Bridge Waiohonu 9/3/02
Sta. 1+00
.035
.04
.035
Legend
WS 500 Yr Storm
WS 100 Yr Storm
WS 50 Yr Storm
Ground
Bank Sta
Elevation (ft)
85
80
75
70
65
60
-300
-200
-100
0
100
200
Station (ft)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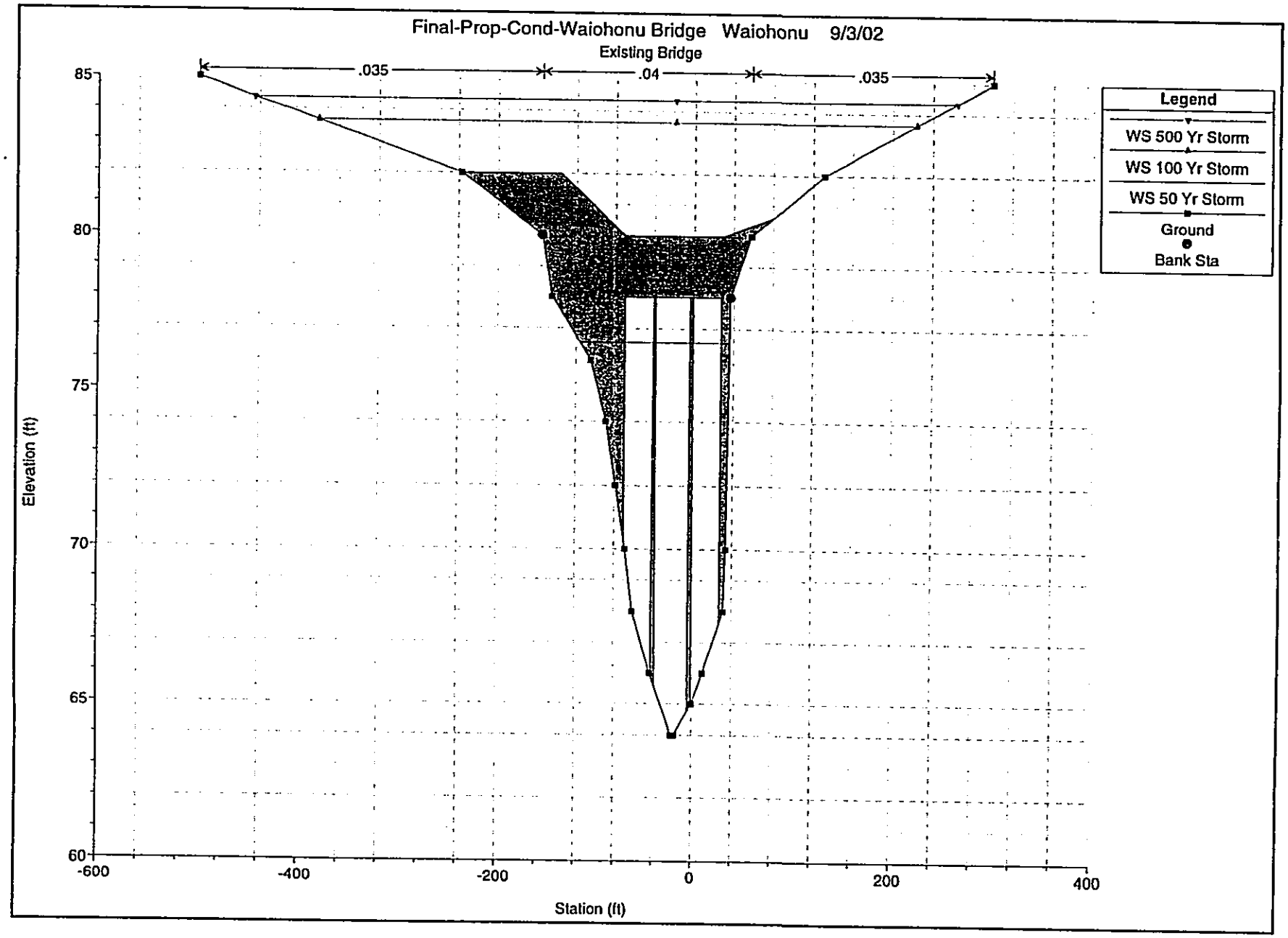
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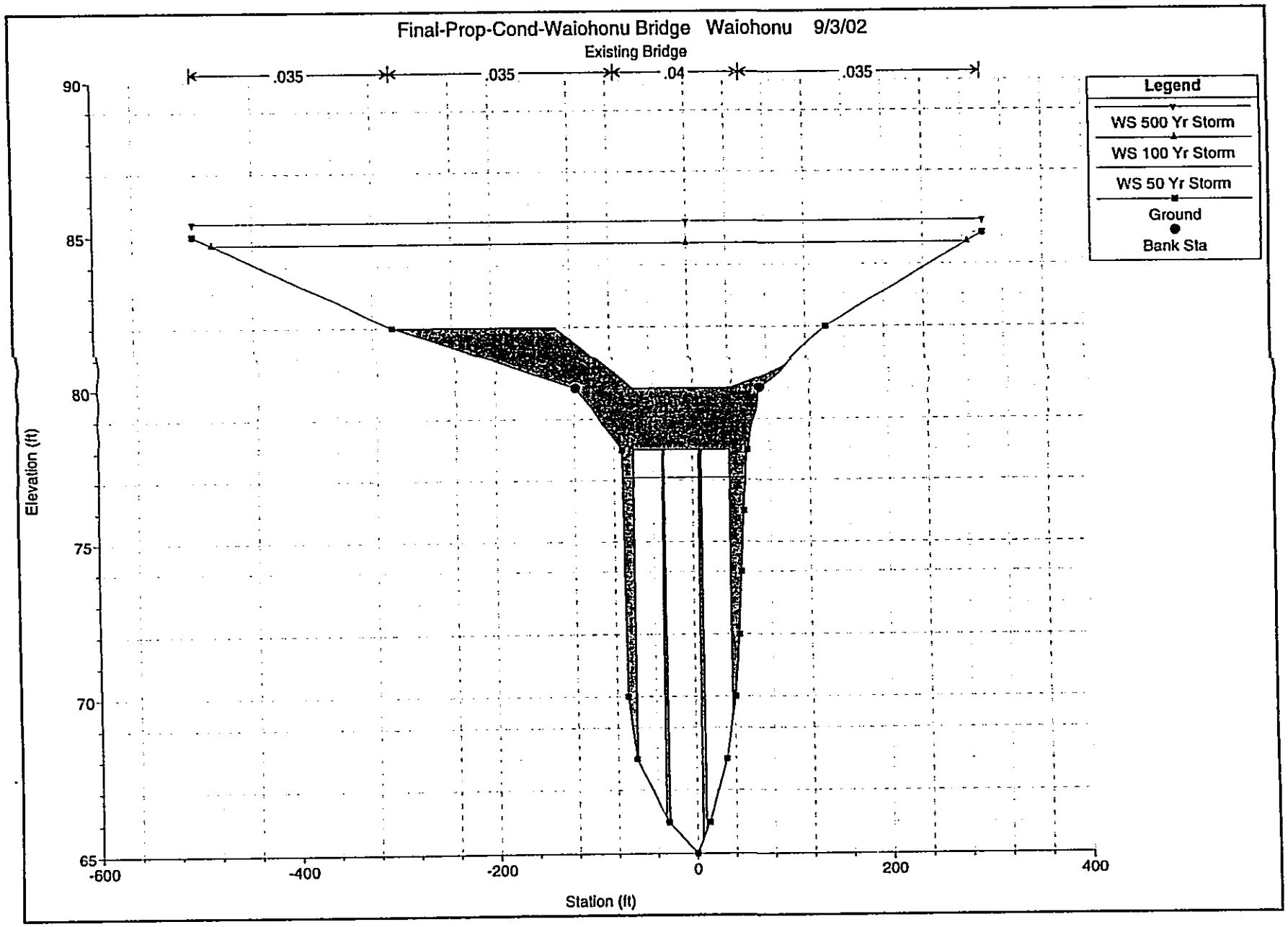
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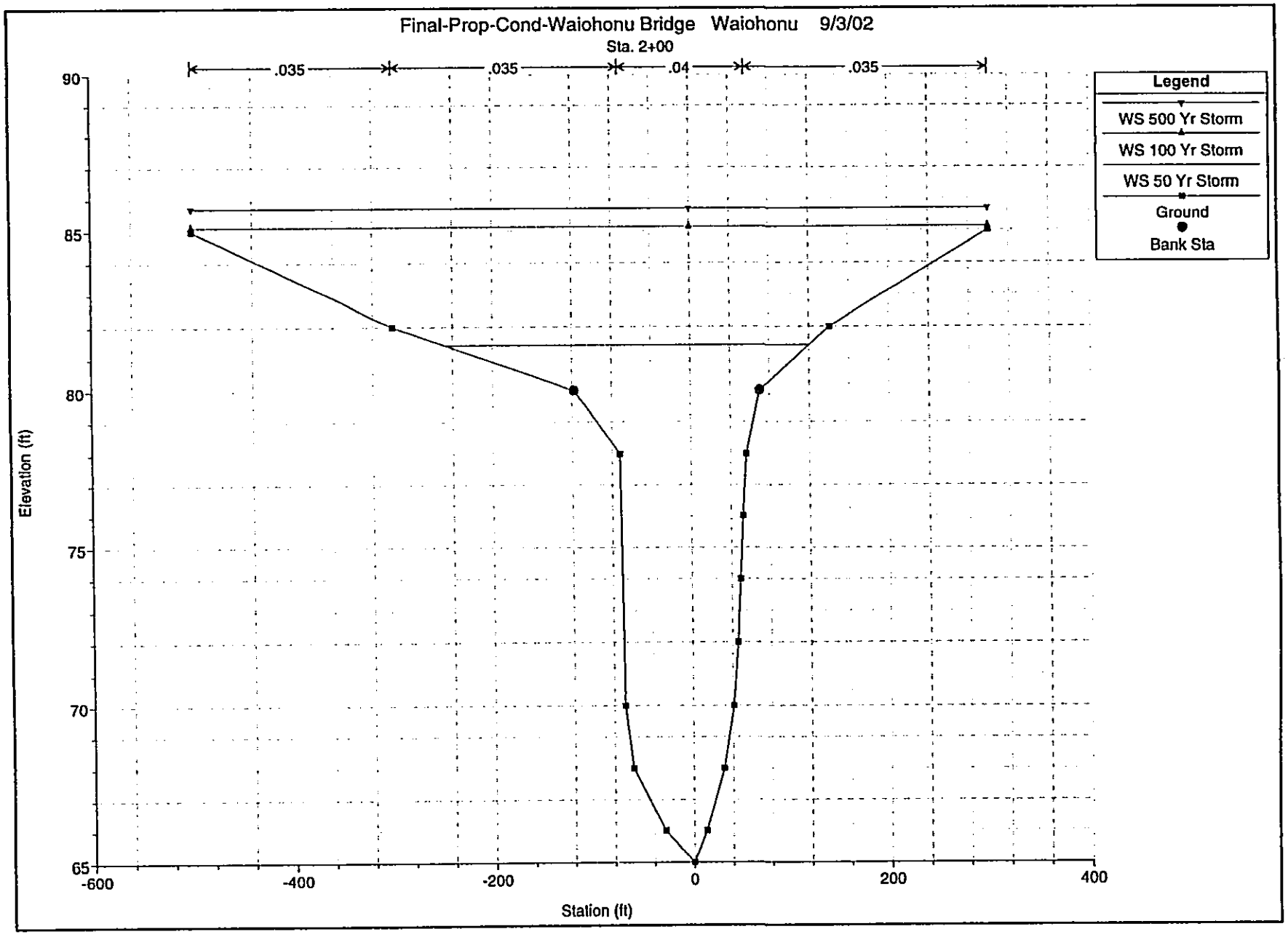
Station (ft)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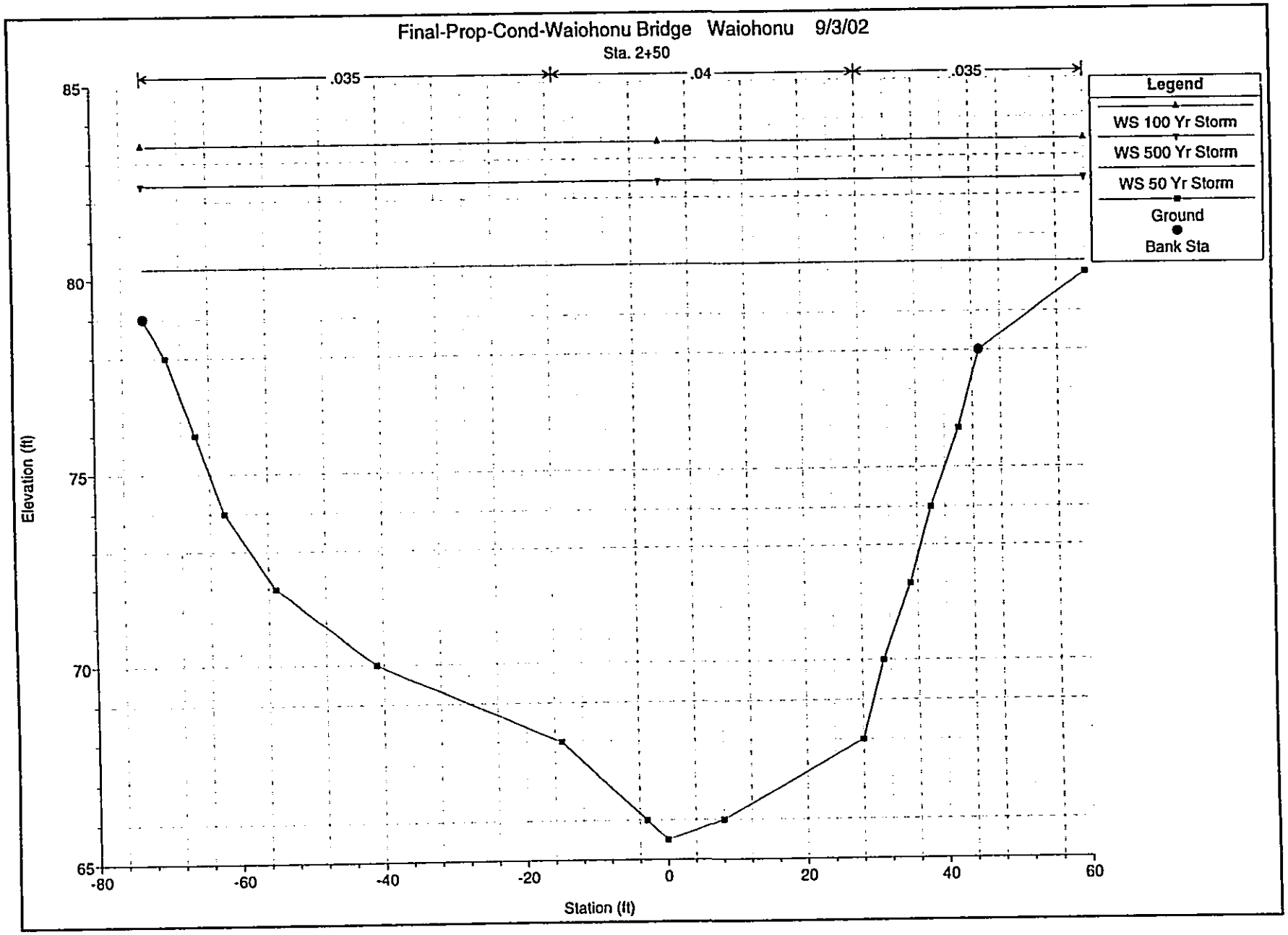
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Legend
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Elevation (ft)
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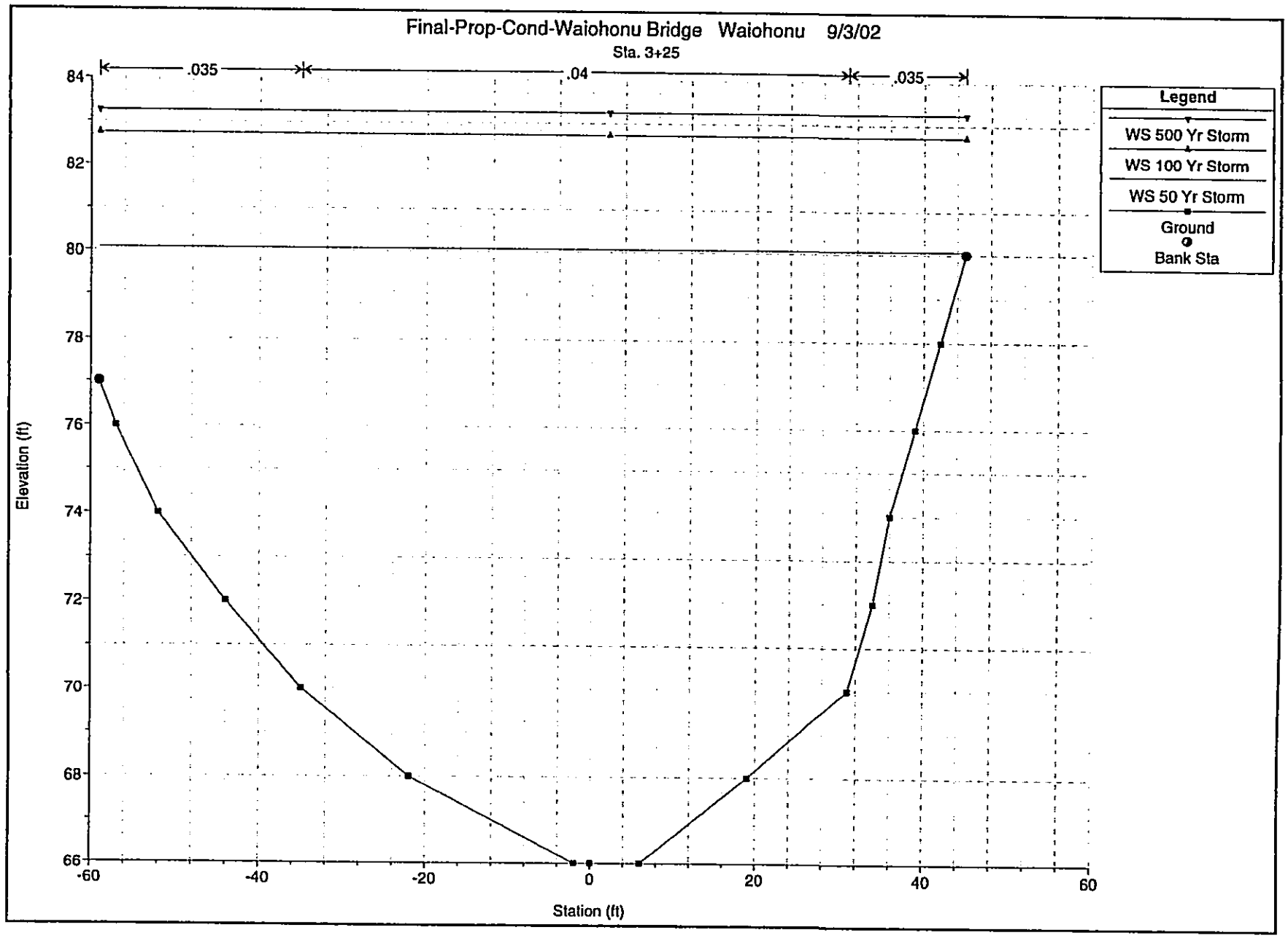
Station (ft)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Legend
WS 500 Yr Storm
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WS 50 Yr Storm
Ground
Bank Sta
Elevation (ft)
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78
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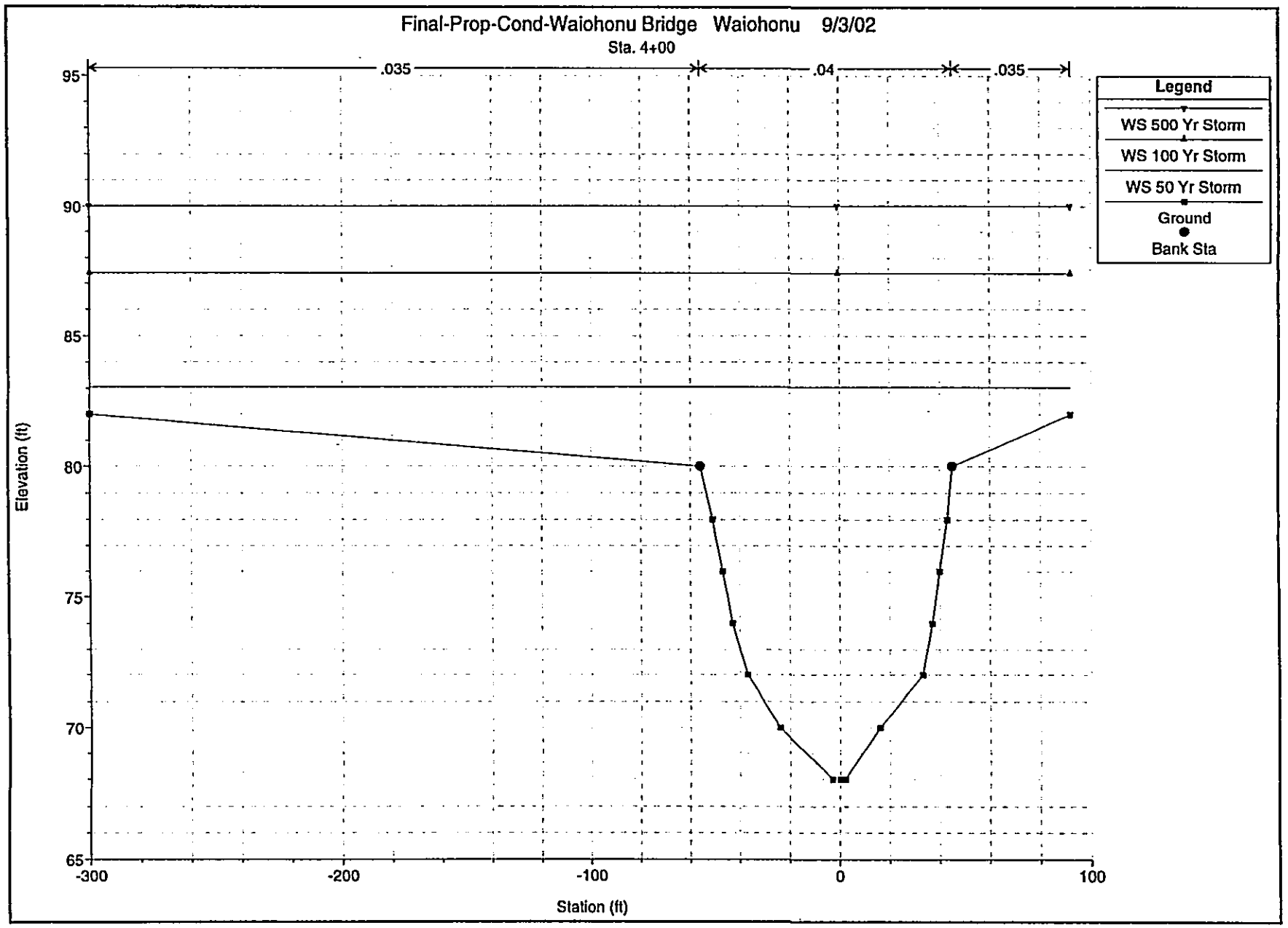
Station (ft)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Station (ft)

APPENDIX G

General Best Management Practice Plan

County of Maui
Department of Public Works and Waste Management

August 2002

GENERAL BEST MANAGEMENT PRACTICE PLAN
WAIOHONU BRIDGE REPLACEMENT
HANA, MAUI, HAWAII

Background: The County of Maui, Department of Public Works and Waste Management proposes to replace the existing one lane concrete Waiohonu Bridge in the Hana District of Maui. The work will include construction of a new one lane concrete bridge and new guardrails at the approaches to the Waiohonu Bridge.

General Notes:

1. Minimize the quantity of exposed soils by minimizing the areas of cut and fill.
2. Construction related equipment and vehicles shall be in proper operating condition. Equipment with lubricant or fuel leakage, or malfunctioning or missing required emissions control devices shall be removed from the project site. The Contractor shall inspect equipment and staging area once during each working day to prevent petroleum based products from leaking on the construction site. Contractor shall keep absorption pads on-site to soak up any accidental spills.
3. No discharge of any treated effluent from any point sources (such as dewatering or hydrotesting effluent) into State water without first obtaining a permit issued by the Department of Health under the authorization of National Pollutant Discharge Elimination System of the Section 402 of the Clean Water Act.
4. The Contractor shall notify the State Department of Health Maui District Health Office at (808) 984-8234 or FAX (808) 984-8237 and the Clean Water Branch at (808) 586-4309 or FAX (808) 586-4352 at least three (3) days prior to construction activity begins.
5. Contractor shall coordinate rerouted utilities with bridge construction in order to maintain continuous utilities service.
6. Contractor shall submit and provide updated timetable for major construction activities, including the date when the Contractor will begin site disturbance, to the State of Hawaii DOH Clean Water Branch and to the County of Maui, Department of Public Works and Waste Management before the commencement of the construction.
7. Washdown of concrete trucks and/or drums will be done at the Contractor's staging area. Staging area shall have berms to contain runoff.
8. No surplus concrete will be allowed to be discharged within the project site.

Fugitive Dust: Construction activities shall comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33 on Fugitive Dust. The contractor shall control dust during the various phases of construction activities and include:

1. Minimizing amounts of dust-generating materials and activities, centralizing material transfer points and on-site vehicular traffic routes, and locating potentially dusty equipment in areas of least impact.
2. Providing or having access to adequate water source for dust control at the site prior to start up of construction activities.
3. Landscaping and/or rapid covering of bare areas, including slopes, starting from the initial grading phase.
4. Controlling of dust from shoulders, project entrances, and access roads.
5. Providing adequate dust control measures during weekends, after hours, and prior to daily start up of construction activities.
6. Install dust screen(s) in areas where fugitive dust could impact residential land areas.
7. Frequent watering during grading to maintain dust control.

Noise Control: Construction activities shall comply with provisions of Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control".

1. The contractor shall obtain a noise permit if anticipated construction activities are expected to exceed the maximum permissible sound levels of the regulations as stated in Section 11-46-6(a).
2. Construction equipment and on-site vehicles requiring an exhaust of gas or air shall be equipped with mufflers as stated in Section 11-46-6(b)(1)(A).
3. Contractor shall comply with the conditional use of the permit as specified in the regulations and the conditions issued with the permit as stated in Section 11-46-7(d)(4).

Bridge Construction: Waiohonu Stream is an intermittent stream and is usually dry in the vicinity of the project site. A new bridge structure is proposed at the Waiohonu Stream at the same location as the existing bridge. A temporary detour road and bridge will be located parallel to the existing bridge on the makai (ocean) side to avoid roadway closure during the new bridge construction work. Construction of the bridge will need to maintain an open drainage way.

1. Bridge related removal/demolition and construction shall occur during periods of low rainfall and minimal or no

stream flow.

2. Construction time within the stream channel shall be minimized.
3. Silt fences shall be installed parallel to the stream banks to limit movement of sediment.
4. Preventive measures, such wood barriers or other appropriate physical methods, shall be utilized to prevent debris material from entering the stream channel. No explosives shall be used for demolition or removal. Materials accidentally fallen into the stream shall be immediately removed.
5. Temporary construction wood/metal concrete form work may be placed temporarily within the stream channel. However, the form work will be removed during periods of rain storm conditions and potential storm water stream flow.
6. Bridge construction related materials shall be lowered from the existing bridge level or accessed by a temporary construction road into the stream channel. The temporary construction road will consist of a base course over filter fabric, which will be removed upon completion of construction within the stream channel. Upon bridge structure completion, all temporary construction road improvements will be removed and the stream channel will be restored to pre-construction condition.
7. Maintain active roadway traffic at all times.
8. Maintain an open drainage way at all times to provide unobstructed water flow during rainy periods.

Although the above construction is anticipated, the contractor shall ultimately be responsible for all means and methods of construction and erosion, dust, noise and water pollution control.

MONITORING AND ASSESSMENT PLAN

For work that occurs within the stream channel, the Contractor shall monitor the stream channel 10 calendar days prior to construction, during construction, and 7 calendar days after construction within the stream channel. Monitoring will include:

1. Maintain a written daily record/log of the precipitation/steam flow conditions for the duration of the construction work within the stream channel. Color photographs (4" x 6" approx. size) shall be taken a minimum of three times per week during construction operations to document conditions within the stream channel. A copy of the written daily record/log and photographs will be submitted on the last working day, every two week to the State of Hawaii DOH Clean Water Branch and to the County of Maui, Department of Public Works and Waste Management. Contractor may request reduced monitoring frequency from the State Department of Health if the site condition is stable.
2. The contractor shall stop work within the stream channel when heavy storm water flows within the work area.

SITE SPECIFIC BEST MANAGEMENT PRACTICE PLAN

Contractor shall submit a Site Specific Best Management Practice Plan(s), and sediment and erosion control plan(s) to the State of Hawaii DOH Clean Water Branch and to the County of Maui, Department of Public Works and Waste Management for review, comment, and approval, since the Contractor is responsible for the project construction methodology, sequence, and compliance with all governmental regulatory environmental and building related codes, conditions, and mandates. Documents shall be submitted for review, comment and approval 30 days prior to commencement of construction. All related concern(s) and comment(s) shall be properly addressed to the Department of Health Director's satisfaction before any discharge occurs.

2003-03-08-MA-FEA-

Waiohonu Bridge Replacement

FINAL ENVIRONMENTAL ASSESSMENT

Prepared for:

The Accepting Authority,
County of Maui Department of Public Works and Environmental Management

Prepared by:

Sato & Associates, Inc.

February 2003

Waiohonu Bridge Replacement

FINAL ENVIRONMENTAL ASSESSMENT

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Prepared by:

Sato & Associates, Inc.

February 2003

Waiohonu Bridge Replacement
County Department of Public Works and Waste Management
Job No. 01-13
Maui County, Hawaii

Environmental Assessment

Submitted Pursuant to the National
Environmental Policy Act (NEPA),
42 U.S.C. 4332(2)(c), 49 U.S.C. 303 and
Chapter 343, Hawaii Revised Statutes (HRS)

U.S. Department of Transportation
Federal Highway Administration
and
County of Maui Department of Public Works
and Waste Management

11/01/02
Date of Approval

David Goode, Director
Department of Public Works and
and Waste Management

10/28/02
Date of Approval

Abraham Wong, Division Administrator
Federal Highway Administration

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The subject of this Environmental Assessment is the proposed re-construction of the Waiohonu Bridge, a substandard 17-foot wide single lane bridge which was constructed in 1915. The reconstruction project will preserve the unique design features while providing a structurally safe passage over the Waiohonu Stream. In keeping with the recommendations presented in the Final Preservation Plan for the County of Maui Within the Hana Highway Historic District, the project shall retain the single lane design, the vertical blaustrade-type railings and the concrete railing caps. The reconstructed bridge will be approximately 18 feet wide (16 feet between railings) and 97 feet long. The new railings will be crash-tested designed, modified to resemble the open-blaustrade railing, with concrete railing caps constructed to a height of 32 inches.

During construction, roadway access will be provided by a temporary detour bridge. The temporary bridge structure will be a pre-manufactured, pre-fabricated modular system utilizing standardized prefabricated components. The bridge will be assembled onsite and installed by a cantilevered launching method, in which the assembled bridge is rolled out across the stream gap. The temporary bridge will be one lane approximately 14-feet wide and span approximately 180 feet over the stream. Construction of the proposed single-lane replacement bridge will be funded using a Federal grant-in-aid obtained by the County through the Highway Bridge Replacement and Rehabilitation Program. Federal Law requires Federal-aid projects to be "designed, constructed, operated, and maintained in accordance with State Laws, regulations, directives, safety standards, design standards and construction standards." (23 U.S.C. 109 p). In Hawaii, this means complying with "A Policy on Geometric Design of Highways and Streets, 2001", otherwise referred to as AASHTO. Because compliance with AASHTO will not allow a single-lane bridge replacement, the County will be seeking a Design Exception under 23 CFR 625. Further, federal funding necessitates the project's compliance with the provisions of Section 106. Preliminary cost estimates for the project indicate a construction cost of $1.5 million, with an anticipated construction duration of approximately 12 months.

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Preface

The County of Maui, Department of Public Works and Environmental Management, proposes to replace the existing Waiohonu concrete bridge; adjust the roadway alignment at the approaches to the Waiohonu Bridge, resurface the roadway and install guardrails at the approaches to the Waiohonu Bridge. Pursuant to the National Environmental Policy Act (NEPA), Chapter 343, Hawaii Revised Statutes, and Chapter 200, of Title 11, Administrative Rules, Environmental Impact Statement Rules, this Environmental Assessment documents the project's technical characteristics and environmental impacts, and advance findings and conclusions relative to the significance of the project.

I. INTRODUCTION

The County of Maui, Department of Public Works and Environmental Management (DPWEM) administers a program to restore, modify or replace functionally or structurally deficient bridges to achieve current standards for roadway widths and load capacities as specified by the American Association of State Highway and Transportation Officials (AASHTO) for Rural Collector Roads. The Waiohonu Bridge, a substandard bridge accommodating two-way traffic, was among the bridges which were prioritized for improvement by the DPWEM for the current fiscal year. The design of the proposed replacement bridge will be based on the recommendations presented in the Final Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District.

This Environmental Assessment was prepared to satisfy the requirements of the National Environmental Policy Act and Chapter 343, Hawaii Revised Statutes relative to the use of County and Federal funds for the replacement of Waiohonu Bridge. Appropriate mitigative measures will be implemented to ensure that the proposed action will not generate significant adverse impacts on the environment.

II. DESCRIPTION OF THE PROPOSED ACTION

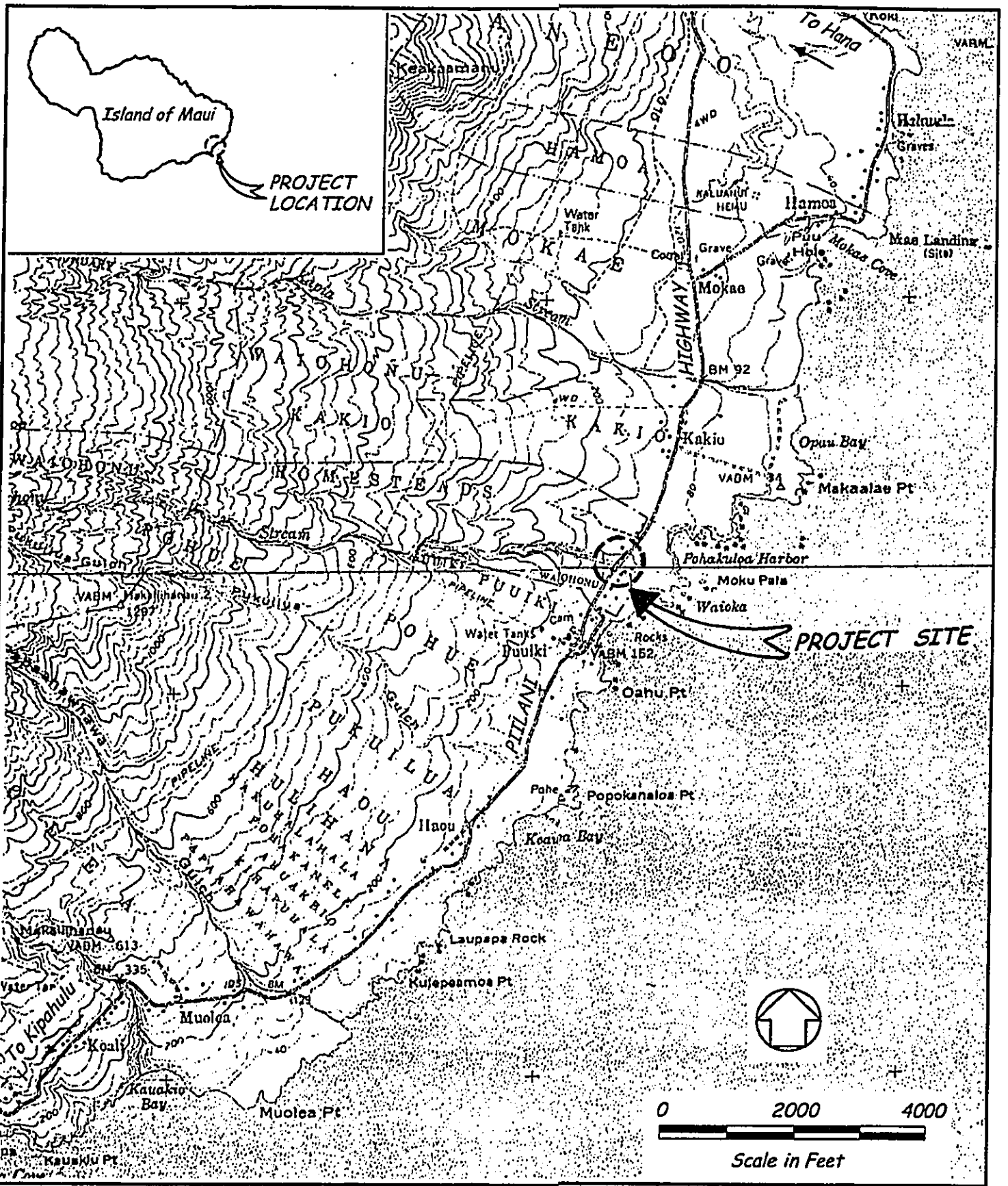
A. Project Location

The Waiohonu Bridge is located in the Hana District of Maui (see Figure 1) and carries Hana Highway over the Waiohonu Stream. Situated approximately 2 miles southwest of Hana Town, the bridge is within Tax Map Key 1-4-12:19, owned by the State of Hawaii. See Figure 2. The Waiohonu Houselots subdivision extends to the north of the bridge on the mauka side of Hana Highway and to the south of the bridge on the makai side of Hana Highway. Refer to Figure 2.

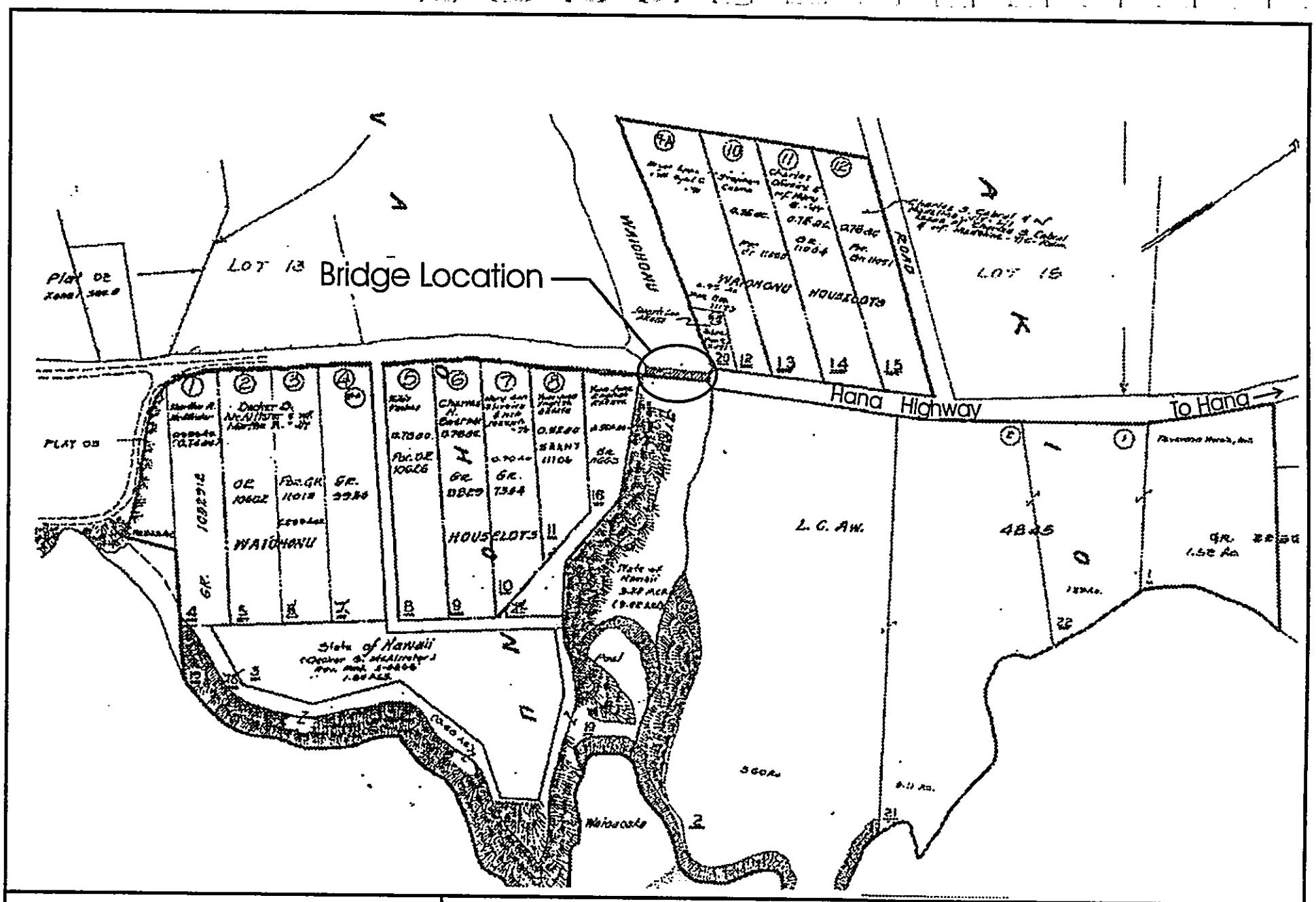
The surrounding vicinity is sparsely developed with single family residences, one of which is situated adjacent to the bridge's north approach, approximately 20 feet mauka of Hana Highway and another is situated adjacent to the bridge's south approach, approximately 60 feet makai of Hana Highway. Additional single family residences are also located within the Waiohonu Houselots subdivision on the north and south sides of the bridge along Hana Highway.

B. Site Description

Vehicular access to the project site is provided by Hana Highway, which is a moderately traveled, narrow and winding roadway with numerous bridge crossings. The highway is classified as a "rural collector" road, varying in width, carrying traffic in two directions along most stretches of the roadway. The highway has many deficiencies when viewed against this "rural collector" classification in the AASHTO for rural collector roads. Waiohonu Bridge is a substandard 16-foot wide single-lane roadway which accommodates two-way traffic. There are currently no guardrails at the approaches to the bridge.



WAIOHONU BRIDGE REPLACEMENT	**FIGURE 1 REGIONAL LOCATION MAP**	Prepared By: Sato & Associates, Inc.



WAIOHONU BRIDGE REPLACEMENT	**FIGURE 2** **PROJECT LOCATION MAP**	Prepared By: Sato & Associates, Inc.

The Waiohonu Bridge is distinguished by its historic nature and aesthetic appeal. Built in 1915, the structure features a narrow, 17-foot single lane deck (15.4 feet between railings), 30-inch vertical balusters, and concrete railing caps. These simple design features of the historic bridge exemplify the rural setting of the Hana region. See Appendix A, Site Photographs.

Although the undercarriage of the bridge is not visible from the road, the support system consists reinforced concrete tee-beams running parallel to the roadway, supported by one concrete rubble masonry (CRM) pier support and three concrete piers, varying in heights between 13 feet and 16 feet. Existing wing walls and abutments are also constructed of CRM as well.

Periodic bridge inspections conducted by the Department of Public Works and Environmental Management (DPWEM) assess the structural integrity of all county bridges. The latest inspection report for the Waiohonu Bridge, prepared in August 2000, offers the following commentary (see Appendix B).

> "This structure is in poor condition. A.C. wearing surface defects allow water to infiltrate concrete slab, leak thru joints, and onto pier caps, abutment seats, piers, and abutments. Girders are typically defected with spalls, reinforcing exposed, some stirrups are missing on these girders, which have rusted away over a period of time. The soffit is typically defected with water stains, efflorescence, and cracking, with new spalling imminent. This structure is a candidate for major rehabilitation or replacement. Vegetation growth around the structure is beginning to grow into the cracks, and CRM. All defects have increased in severity, with moderate amounts of water leaking through the soffit."

C. Project Description

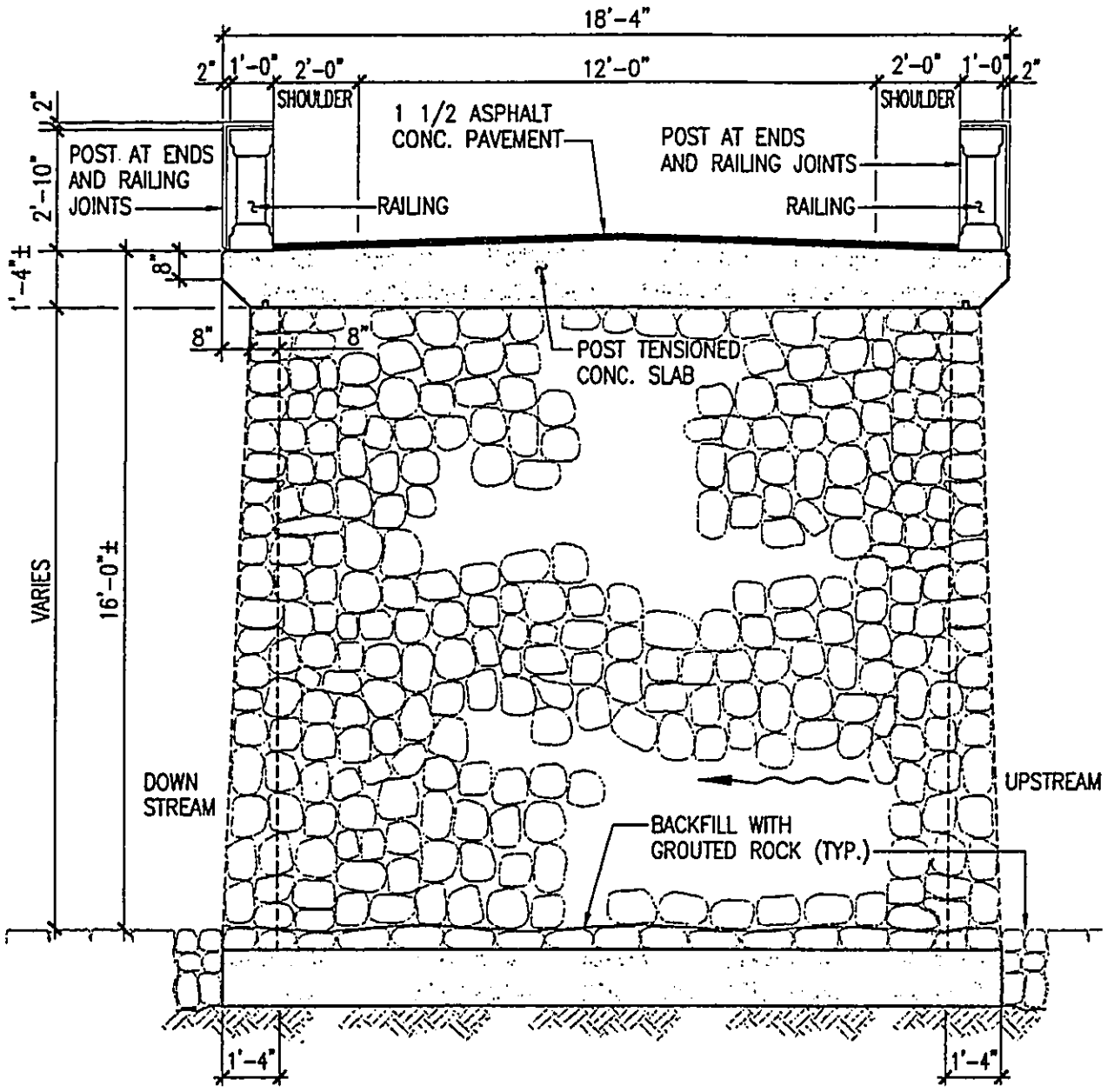
Given the structural deficiencies of the Waiohonu Bridge, the DPWEM proposes bridge reconstruction which will preserve its unique design features while providing a structurally safe passage over the Waiohonu Stream. In keeping with the recommendations presented in the Final Preservation Plan for

the County of Maui Bridges Within the Hana Highway Historic District, the project shall retain the single lane design, the vertical balustrade-type railings and the concrete railing caps. The new bridge will be approximately 18 feet wide (16 feet between railings) and 97 feet long. See Figure 3 and Figure 4. The new railings will be crash-tested design, modified to resemble the existing open-balustrade railing, with concrete railing caps constructed to a height of 32 inches.

In addition, the undercarriage of the bridge will be reconstructed, supported by two concrete center piers, faced with rock veneer resembling the original CRM pier. The bridge structure will be surfaced with a cast-in-place concrete deck, supported by three or four concrete girders. Concrete abutments and wing walls will be reconstructed and finished with rubble from the original structure. Upon project completion, the load rating will be increased from 12 tons to 20 tons.

A Drainage Report for the Waiohonu Bridge project was prepared by Sato & Associates, Inc. in January 2002, indicating that the 100-year 24-hour storm peak runoff flow overtops the bridge by approximately 2.5 feet. The new bridge structure will also be designed to withstand this storm flow. To improve the flow at the bridge, the new design will incorporate no more than two piers. Piers are required to keep the structural members of the bridge comparable to the existing structural elements so that the appearance of the bridge will not be drastically modified.

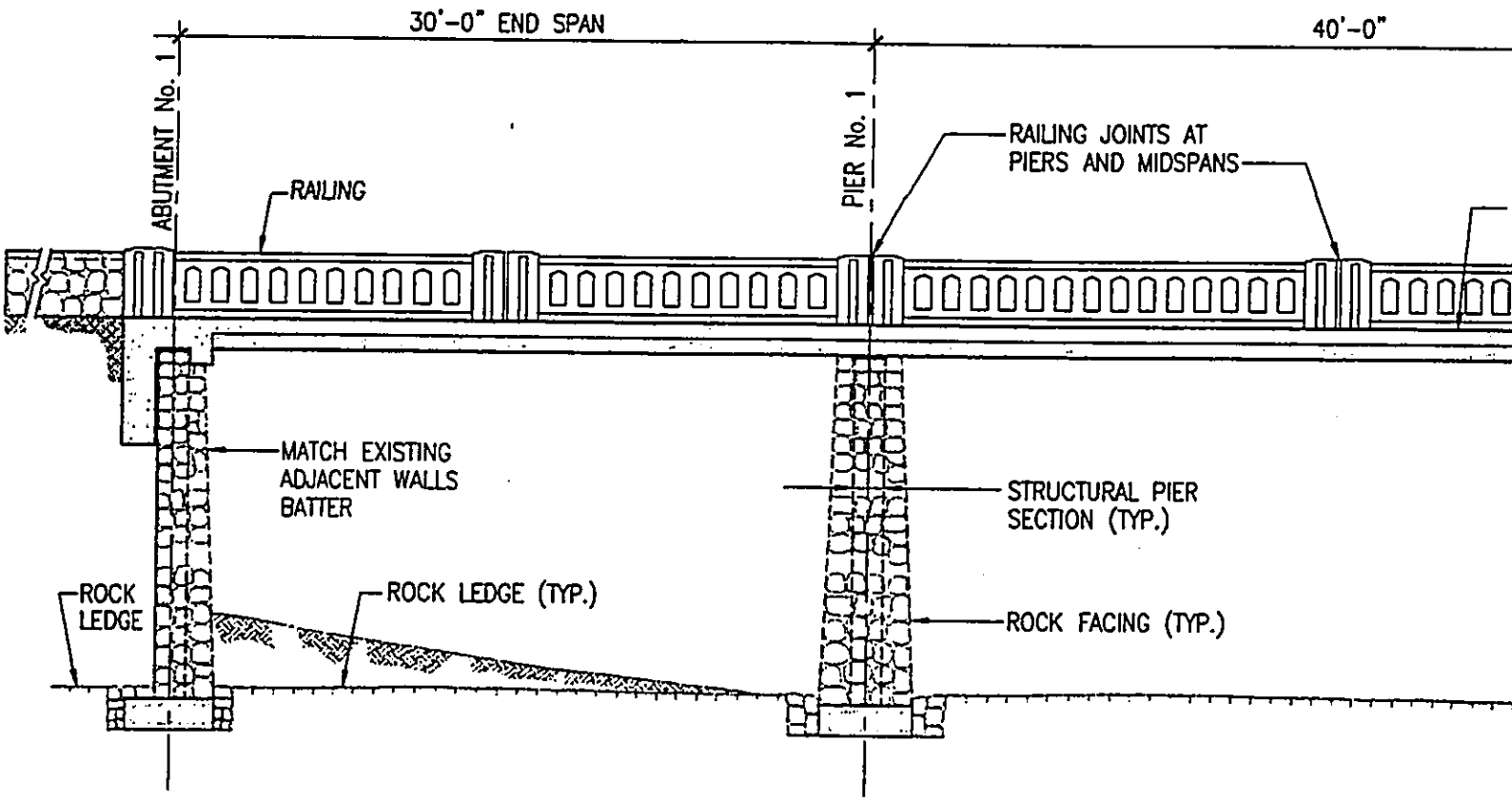
Construction will be completed in two phases. The first phase will involve the construction of a makai detour consisting of temporary paved approaches and a temporary bridge crossing the Waiohonu Stream. During this phase, the existing bridge will remain open to accommodate the traffic on Hana Highway.



A / S-2 BRIDGE SECTION

Source: Sato & Associates, Inc.

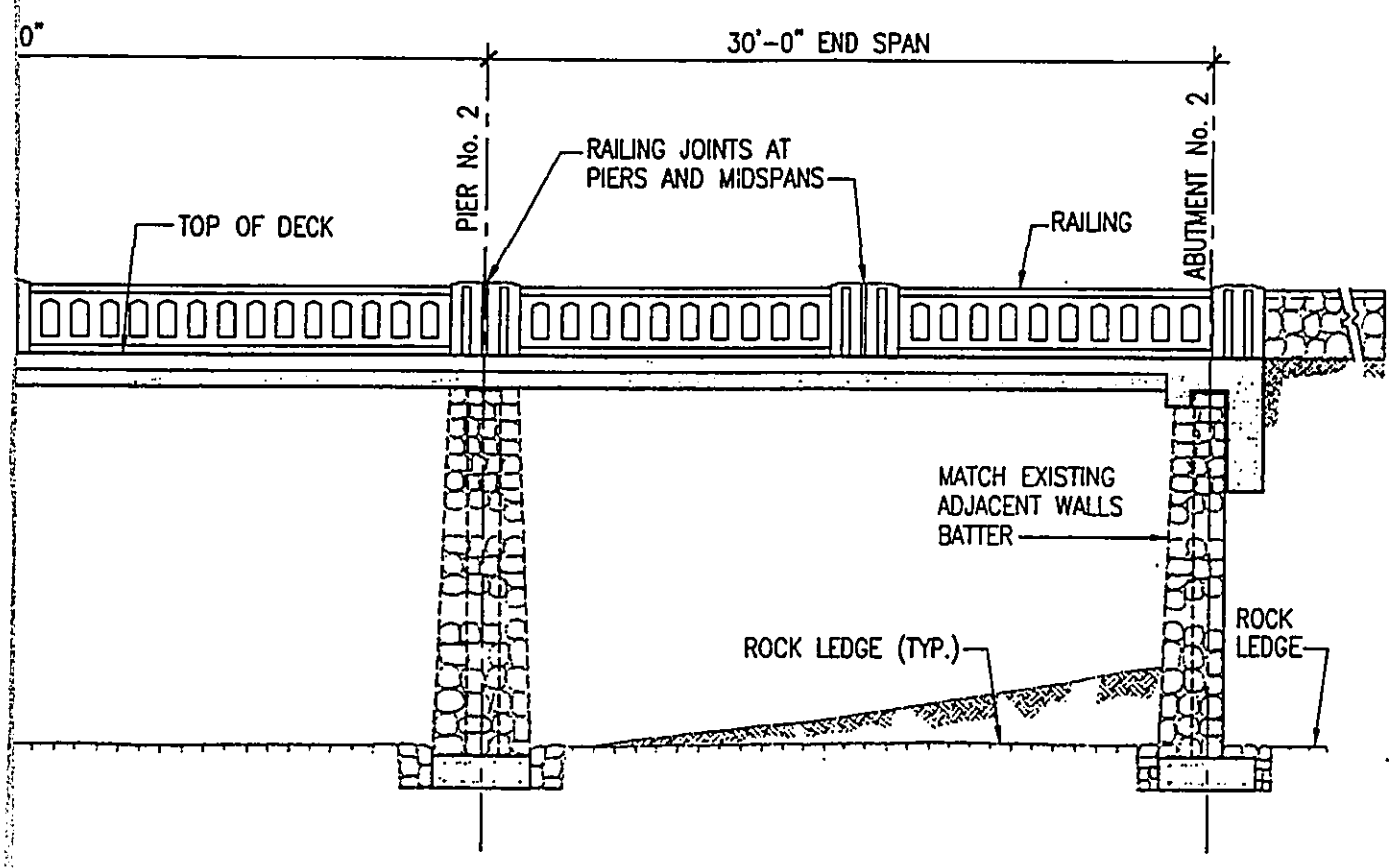
WAIOHONU BRIDGE REPLACEMENT	*FIGURE 3* *BRIDGE CROSS SECTION*	*Prepared By:* *Sato & Associates, Inc.*



Source: Sato & Associates, Inc.

WAIOHONU BRIDGE
REPLACEMENT

FIGURE 4
BRIDGE ELEVATION



URE 4
ELEVATION

Prepared By:

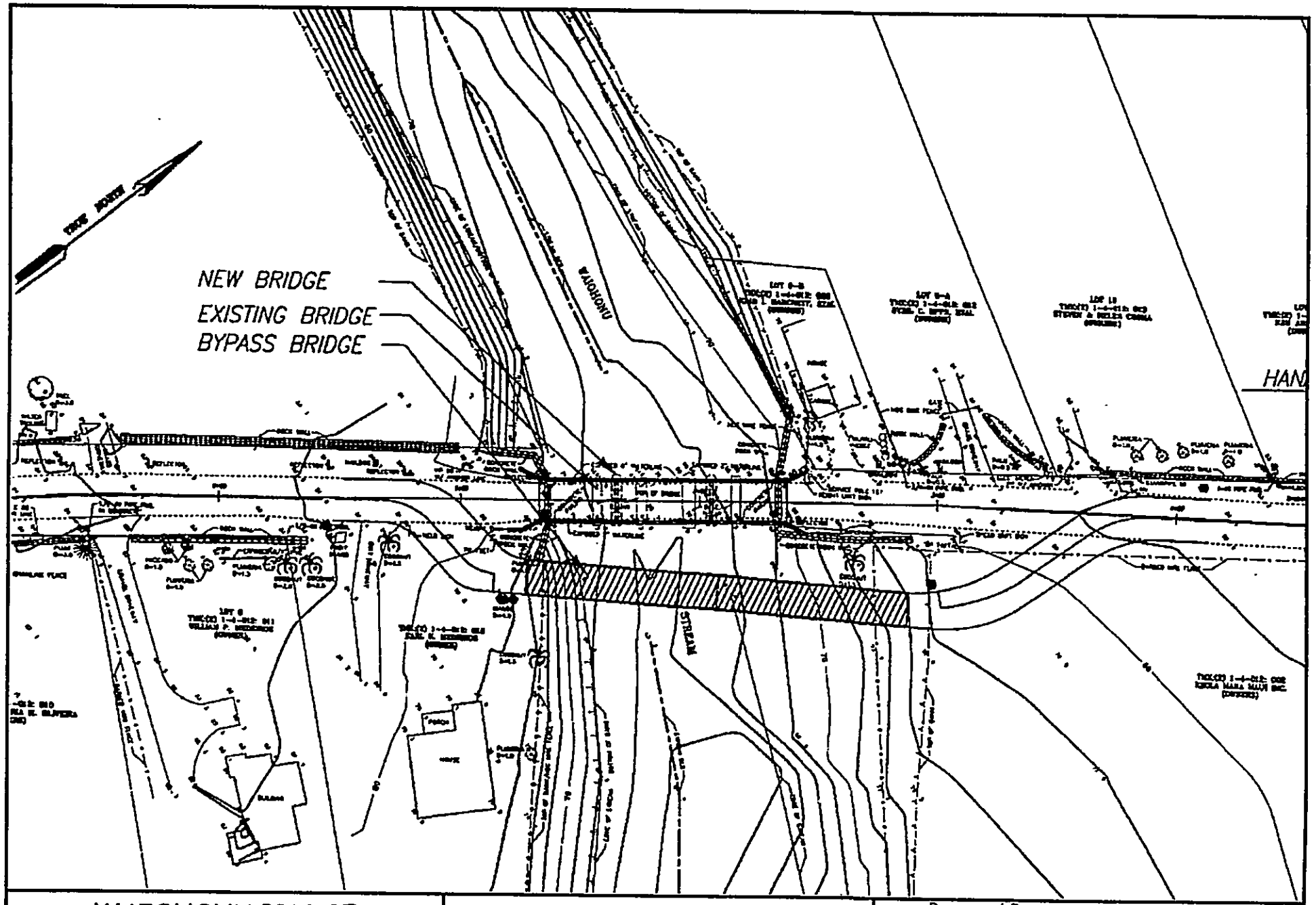
Sato & Associates, Inc.

During the second phase of construction the traffic will be accommodated by the temporary detour road and bridge, while the existing bridge is dismantled and the new abutment, wing walls, piers, bridge deck, railings, approaches and guardrails are constructed. See Figure 5. Upon completion of the new bridge, the temporary detour road and bridge will be removed and the area will be restored to near preconstruction conditions.

The temporary detour bridge will be a pre-engineered, pre-manufactured modular system utilizing standardized prefabricated components. The bridge components will be delivered to the site in 20 foot containers. The bridge will be assembled onsite and installed by a cantilevered launching method, in which the assembled bridge is rolled out across the stream gap. This launching procedure is accomplished without falsework or heavy equipment. If required, the bridge may also be hoisted and placed by a crane. The temporary bridge will be one lane approximately 14 feet wide and span approximately 180 feet over the stream.

Construction of the proposed single-lane replacement bridge will be funded using a Federal grant-in-aid obtained by the County through the Highway Bridge Replacement and Rehabilitation Program. Federal Law requires Federal-aid projects to be "designed, constructed, operated, and maintained in accordance with State Laws, regulations, directives, safety standards, design standards and construction standards." (23 U.S.C. 109(p)). In Hawaii, this means complying with "A Policy on Geometric Design of Highways and Streets, 2001", otherwise referred to as AASHTO. Because compliance with AASHTO will not allow a single-lane bridge replacement, the County will be seeking a Design Exception under 23 CFR 625.

The preliminary cost estimate for this project is $1.5 million, with an anticipated construction period of approximately 12 months. Acquisition of a right-of-entry on the private properties that will be utilized for the temporary approaches leading to the temporary bridge will be required as well as a right-of entry from the State for the temporary bridge.



WAIOHONU BRIDGE REPLACEMENT	FIGURE 5 TEMPORARY BRIDGE	Prepared By: Sato & Associates, Inc.

III. EXISTING ENVIRONMENT AND ANTICIPATED IMPACTS

A. Surrounding Land Uses

1. Existing Conditions

As previously noted, the project site is located southwest of Hana Town, in an area of rural and agricultural lands. The Waiohonu Houselots Subdivision extends to the northwest of the bridge (in the direction of Hana town), on the mauka side of the roadway. The same subdivision also extends to the southeast of the bridge (in the direction of Kipuhulu), makai of the roadway. Lands to the northeast and to the southwest of the bridge are in pasture use for cattle.

2. Assessment of Impacts

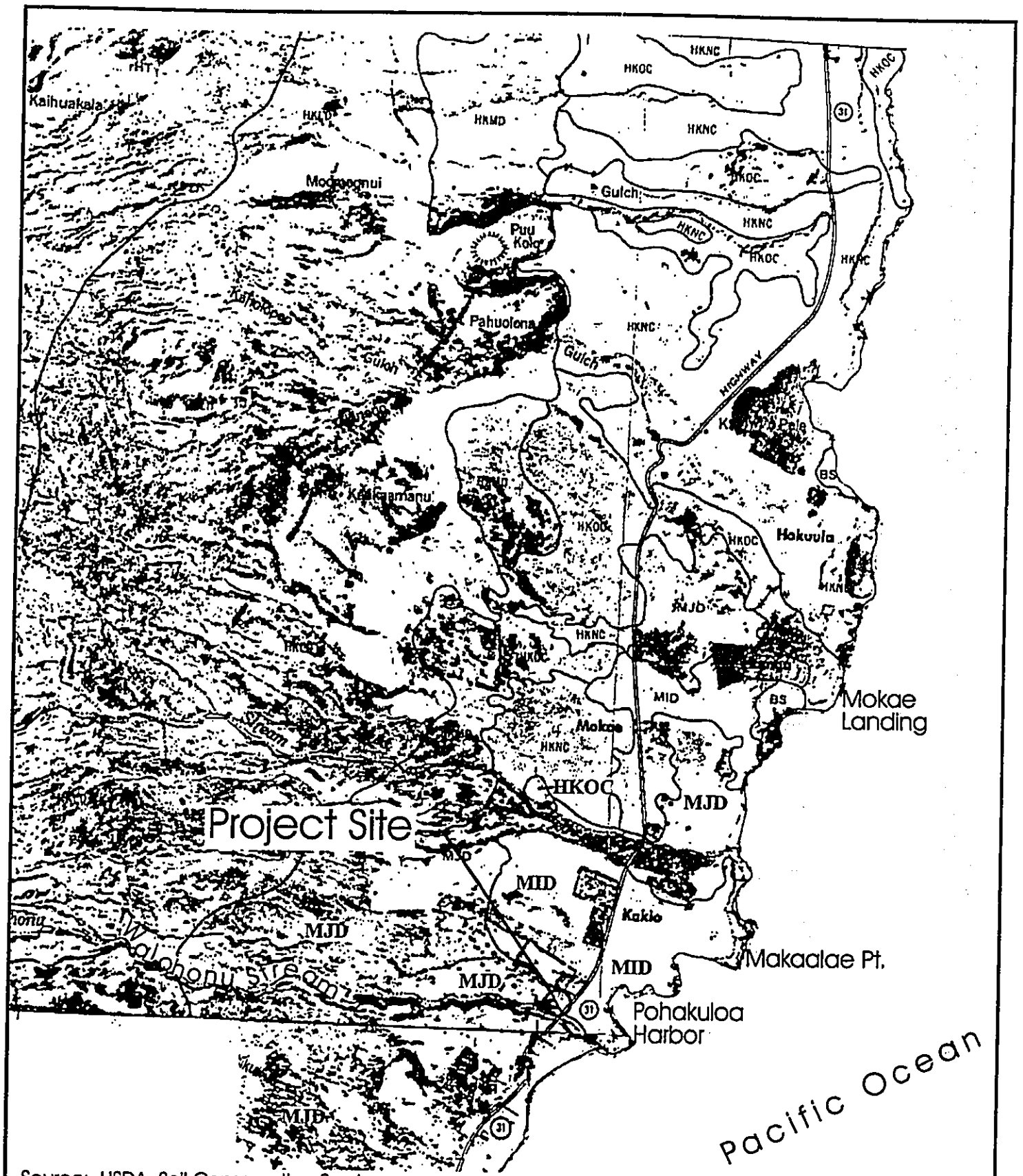
The proposed project is limited to the reconstruction of an existing bridge structure along the Hana Highway, with no anticipated long-term impacts to surrounding land uses. During construction, however, implementation of a temporary bridge structure and the rerouting of traffic may result in short-term impacts to surrounding properties. The temporary detour is designed to minimize potential adverse impacts created by a road closure during project-related construction activities. Accordingly, the County of Maui DPWEM will coordinate with individual property owners to ensure that the temporary bridge impacts are mitigated to the greatest extent possible. Finally, appropriate best management practices (BMPs) will be implemented during the reconstruction period to ensure that neighboring land uses are not adversely impacted by the proposed project.

B. Topography and Soils

1. Existing Conditions

The subject property is located at approximately 80 feet above mean sea level (amsl), and slopes in a west to east direction. According to the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, soils underlying the project site are of the Hana-Makaalae-Kailua Association. These soils are characterized by moderately deep and deep, gently sloping to steep, well drained soils that have a moderately fine textured or fine textured subsoil or underlying material, located on intermediate upland areas.
The soil series specific to the project site is the Makaalae extremely stony silty clay, 7-25 percent slopes (MJD). See Figure 6. This soil type is common to rough, low mountain slopes, with stones covering 3 to 15 percent of the surface. Permeability is moderate, while runoff is slow to medium, and the erosion hazard is slight to moderate.

A soils investigation was completed in connection with the proposed project in the environment immediately beneath the Waiohonu Bridge. See Appendix C. The investigation included drilling multiple borings to depths of approximately 15 to 16 feet deep. The testing found that the dry streambed environment is comprised of medium hard to hard basalt, which extend to the maximum of the depths drilled. The investigation also determined that numerous clinker seams/pockets exist within the basalt strata, varying in width from a few inches to several feet in thickness.



Source: USDA, Soil Conservation Service

WAIOHONU BRIDGE REPLACEMENT	FIGURE 6 SOIL CLASSIFICATION MAP 1" = 4000'	Prepared By: Sato & Associates, Inc.

2. Assessment of Impacts

The proposed reconstruction of Waiohonu Bridge will be limited to the existing right-of-way, and is not anticipated to significantly alter local topographical or soil conditions.

C. Flood and Tsunami Hazards

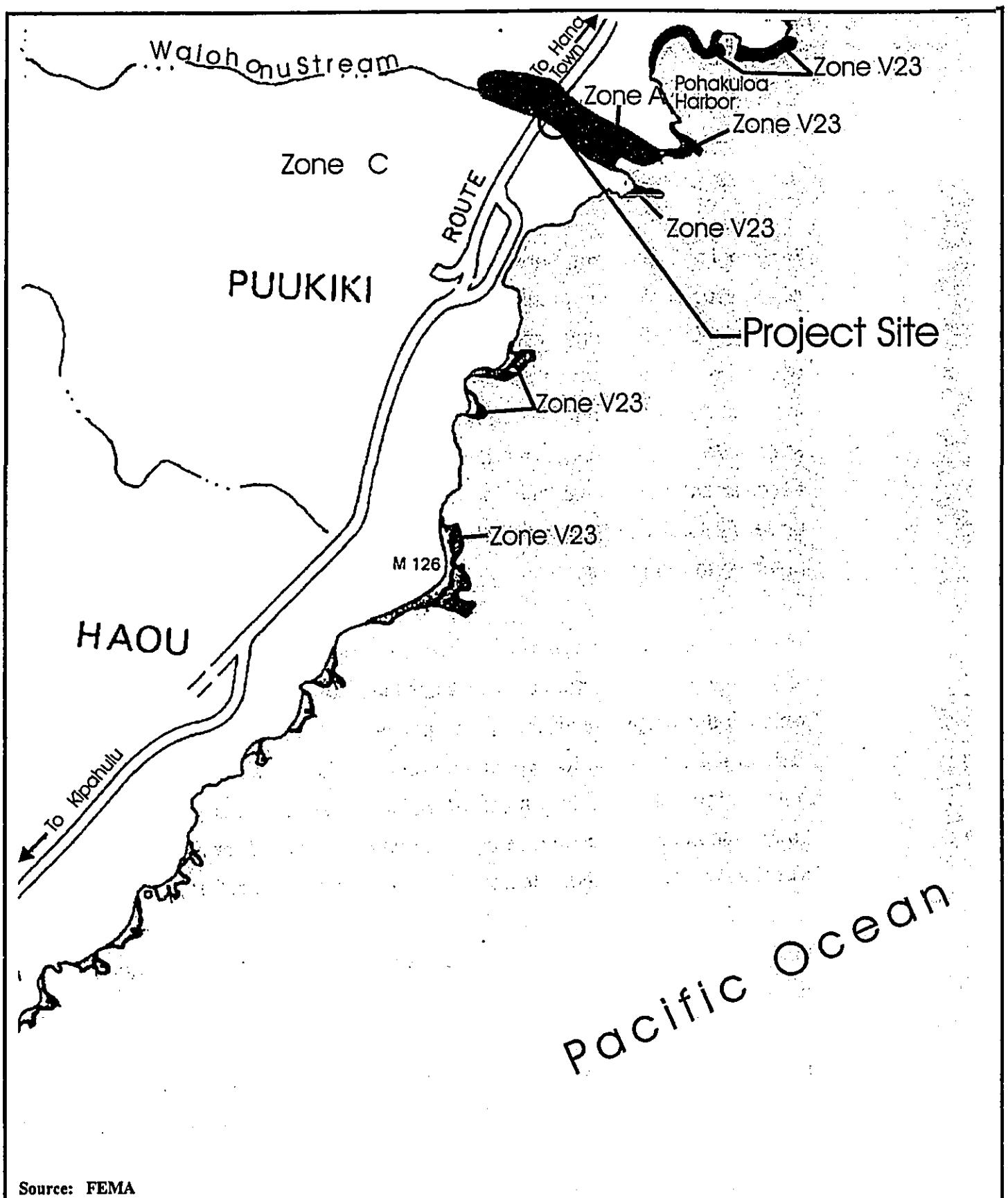
1. Existing Conditions

Lands underlying the subject property are designated as Zone A, or areas of 100 year flooding with base flood elevations and flood hazard factors not determined. See Figure 7. In addition, the subject property is located beyond the reaches of the tsunami inundation zone.

According to the drainage report prepared for the proposed project, storm flow for a 100-year storm would rise approximately 2.5 feet over the top of the proposed bridge structure.

2. Assessment of Impacts

The reconstructed bridge will be designed to withstand the 24-hour peak storm flow of a 100-year storm. No adverse impacts from flood and tsunami hazards are anticipated as a result of the proposed action. In addition, the project will be developed in compliance with all applicable flood zone standards.



Source: FEMA

WAIOHONU BRIDGE REPLACEMENT	FIGURE 7 FLOOD INSURANCE RATE MAP 1" = 1000'	Prepared By: Sato & Associates, Inc.

D. Biological Resources

1. Existing Conditions

A Biological Resources Survey (Xamanek Researches) was conducted of the area surrounding the Waiohonu Bridge Replacement Project. See Appendix D. The study encompassed an area extending 200 feet upstream and 200 feet downstream from the Waiohonu Bridge and includes the Waiohonu Stream bed and the margins on both sides of the stream bed. This survey was done to determine if any species of vascular plant or animal found in the vicinity of the bridge is protected under Federal and State Law, which would require consideration for planning in the project.

The species of vascular plants encountered during the biological resources survey are members of a Lowland Mesic Forest Community, which is dominated by invasive alien plants. The plants encountered include the Java plum (Sysygium cumuni), elephant grass (Pennisetum purpureum), 'ape (Alocasia macrorrhiza), coconut (Cocos nucifera), kukui (Aleurites moluccana), noni (Morinda citrifolia), ti (Cordyline fruticosa), hala (Pandanus tectorius), ka'e'e (Mucuna gigantea), and laua'e (Phymatosorus scolopendrium). No vascular plants with protection under Federal or State Law were encountered in the project area.

In the vicinity of the project site, Waiohonu Stream is an intermittent stream fed by runoff rainwater. The pools formed by the runoff provide the potential for several forms of aquatic life. The species of aquatic life encountered include mosquito larvae, bufo toad tadpole (Bufo marinus), bufo toad adult, dragonfly nymphs, Hawaiian dragonfly (Anax strenuus), and Chinese dragonflies (Crocothemis servilia).

Other animal life encountered in the study corridor included a honey bee (Apis mellifera), a spiny-backed spider (Gasteracantha mammosa), vinegar flies (Drosophila melanogaster), and a brown slug (Vaginalis plebius). There was also evidence of rats (Rattus sp.) along the stream margin.

Three avian species were observed in the area. These include a house sparrow (Passer domesticus), spotted doves (Streptopelia chinensis), and myna birds (Acridotheres tritis).

2. Assessment of Impacts

No vascular plant species, insect, mollusk, fish, amphibian, avian, or mammalian animal species with protection under Federal or State Law were encountered in the project area. Therefore, there are no biological resources found in the proposed corridor that require special consideration for planning in the project.

E. Stream Survey

1. Existing Conditions

A Stream Survey was conducted by R.A. Englund and D.J. Preston of the Hawaii Biological Survey of the Bishop Museum. See Appendix E. An assessment of native and introduced aquatic biota of the Waiohonu Stream in the vicinity of the project site was conducted in December 2001. No endangered or federal listed species of concern were observed during these surveys.

This survey covered an area from 200 meters upstream of the Waiohonu Stream bridge and extended downstream into a large estuary

pool at the ocean. Waiohonu stream in the vicinity of the Waiohonu Bridge is intermittent, and only flows after periods of heavy rains. The area around the bridge, and for a significant distance upstream is normally dry and only supports transient aquatic life. No aquatic biota except for flying adult dragonflies were observed in this area. No endangered or federally listed species of concern were observed during these surveys.

Downstream of the Waiohonu Bridge, two large cascades drop through a deeply incised columnar basalt channel. The most upstream cascade drops approximately 50 ft. and shortly thereafter a second large cascade drops another 40 ft. over a series of sheer bedrock. The terminal estuary pool at the ocean lies at the end of the second cascade and contains only native aquatic biota. At the time of the field work, the estuary had surface salinities of 6 ppt, but the fauna observed while snorkeling indicates this area is likely more brackish than fresh during most of the year. The only fish observed were *Eleotris sandwicensis* and *Kuhlia xenura*, both of which are highly tolerant to brackish waters, and are native species. The native mussel *Isognomon californicum* densely covered the rock walls of the Waiohonu Stream estuary, while the endemic *Theodoxus cariosus* was occasionally observed among the thick masses of mussels. No native brackish or freshwater crustaceans were observed in the estuary area, although one small marine crab was observed, which could not be caught and identified.

A total of three species of aquatic insects were collected during this survey. The aquatic insects collected are typical of those found along intermittent stream channels, with adult dragonflies dominating the insect fauna in this area. Immature aquatic insects and other adult aquatic insects were not found in Waichonu Stream, reflecting the intermittent nature of this stream at lower elevations.

2. Assessment of Impacts

The proposed action will not involve diversion of waters during and after construction. BMPs will be employed during construction to prevent soil erosion into downstream areas and nearshore ocean environment. Adverse impacts to native stream biota are not anticipated as the result of construction during the proposed Waiohonu bridge replacement project.

F. Air Quality

1. Existing Conditions

The project site is located in a rural/agricultural area. The sparsity of development and exposure to trade winds promote good air quality in the project area. The only identifiable source of pollution is the light volume of traffic using the bridge.

2. Assessment of Impacts

During the short-term construction period, occasional emissions of fugitive dust and exhaust from construction equipment will impact air quality in the project vicinity. These impacts will be mitigated through proper use of appropriate BMPs.

Post-construction traffic volumes and associated exhaust emissions along the roadway is not anticipated to increase as a result of the project.

G. Noise Characteristics

1. Existing Conditions

In the rural setting of the project site, ambient noise levels are relatively low. The primary source of noise is from light vehicular traffic along Hana Highway.

2. Assessment of Impacts

In the short-term, noise levels at the project site will temporarily increase as a result of construction equipment and activities. Noise-sensitive land uses in the immediate vicinity include the nearby residences. All equipment, however, shall be fitted with muffling devices to mitigate noise impacts. No long-term adverse noise impacts are anticipated.

H. Scenic and Visual Resources

1. Existing Conditions

Hana Highway offers scenic views from many locations along its route. Open pasture areas are found in the nearby vicinity. However, the project site is not a part of a scenic view corridor.

2. Assessment of Impacts

From the project area, ocean and mountain views are obscured by dense vegetation. The scenic quality of the area will not be adversely affected by the new bridge. The new bridge is designed to maintain a low profile comparable to the existing bridge structure.

I. Historical and Archaeological Resources

1. Existing Conditions

In July 2001, a field inspection was conducted on the subject parcel by Patty Jo Conte, of the State of Hawaii, Department of Land and Natural Resources, Interagency Archaeology Section. It was determined by this field inspection that it was unlikely any significant historic sites are present in the proposed project area.

2. Assessment of Impacts

Prior to construction, the project will require approvals under Section 106 of the National Historic Preservation Act and Chapter 6E, Hawaii Revised Statutes for demolition of the existing bridge. Both approvals will be processed simultaneously through the Department of Land and Natural Resources, State Historic Preservation Division. Further, review by the Maui County Cultural Resources Commission will be undertaken in connection with the Special Management Area permit process which is required for the proposed action.

J. Cultural Impact Assessment

1. Local Resident Interviews

In order to obtain background information pertinent to assessing the project's potential impact on traditional and cultural resources, interviews were conducted with neighboring landowners and longtime Waiohonu Homestead residents, Earle Medeiros and Stephen Cosma.

Mr. Steven Cosma moved to Waiohonu Homestead area as a young child in the mid-1940's, where he was raised on land identified by TMK (2) 1-4-12:13. Many of his early memories include fishing experiences along the coastal areas makai of the Waiohonu Bridge. To access the fishing areas along the coast, Mr. Cosma used an access trail which traverses Hana Ranch lands, identified as TMK (2) 1-4-12:2.

Mr. Cosma recalled times as a young child when he and his friends would sit on the rocks at the river mouth of Waiohonu Stream, fishing the fresh water pools for both fresh fish and ocean fish. Mr. Cosma stated, "sometimes, the mountain water was so big, it broke open the pond, and the (ocean) fish went inside. After that, we used to go down and hook a'hole and o'opu in the fresh water....we used earthworms as bait. I don't know if get now."

Mr. Cosma's father was an accomplished fisherman, who also used to fish the coastal waters to feed his family.

During big rain storms, it was common for Hana fishermen to gather at the Waiohonu Stream mouth. In one instance, Mr. Cosma recalled a big storm when local fishermen caught "plenty of big uluas".

Today, the fishing areas are still accessed by the same trails along the Hana Ranch pasture lands. Mr. Cosma continues to use the same trail to fish the coast and pick opihi.

Mr. Earle Medeiros was also raised in the Waiohonu Homestead area, on the property immediately south of the Waiohonu Stream. Mr. Medeiros also spent time growing up in the Hamoa Haneo'o area, where he lives today. Like Mr. Cosma, many of Mr. Medeiros's early memories revolve around fishing the shoreline areas makai of Waiohonu Bridge.

Mr. John English, father of Earl Medeiros, also used to fish along the coastal waters in East Maui from Aleamai to Kaupo. Some Hana residents still recall that Mr. English, as a young man, was the designated fisherman for the villagers during times when the village would collectively travel mauka to work the taro patches.

Growing up, Mr. Medeiros spent many days fishing the coastal waters with Mr. Cosma. Today, both continue to use the trail along the Hana Ranch lands to access the coastal waters. Mr. Medeiros noted the trail is also used by visitors who access Waiohonu, also referred to as Waioakaaka in earlier times.

Incidentally, Mr. Medeiros also noted the location of several old Portuguese bread ovens, in the vicinity of the fishing access trail, which still exist today.

2. Cultural Impact Assessment

In recent years, Mr. Cosma and Mr. Medeiros did not recall any particular traditional or cultural practices which have occurred or are common to the Waiohonu Bridge area. Both individuals were able to attribute personal experiences to an existing fishing access trail, located north of the project site. Mr. Cosma and Mr. Medeiros also noted that the trail was used by other local fishermen from the Hana area. In addition, the interviewees noted the presence of petroglyphs and bread ovens, both of which are located beyond the limits of the project site.

Under current project plans for reconstruction of the Waiohonu Bridge, the fishing access trail discussed by Mr. Cosma and Mr. Medeiros will not be impacted. In addition, no other traditional or cultural practices

have been identified which would be adversely impacted by the proposed project.

K. Public Services

1. Police and Fire Protection

a. Existing Conditions

Headquartered in Wailuku, police protection for the island of Maui is provided by the Maui Police Department (MPD), which includes the Wailuku, Lahaina and Hana patrol districts. The Hana patrol division covers the area from Kaupo to Kailua, and is based out of the Hana substation in Hana Town, located at the intersection of Hana Highway and Uakea Road.

Fire prevention, suppression and protection services are provided for the County of Maui by the Department of Fire Control. The department maintains a fire station in Hana Town which is also located at the intersection of Hana Highway and Uakea Road.

b. Assessment of Impacts

The proposed Waiohonu Bridge improvements are not anticipated to adversely impact police and fire protection services in the Hana Region. During construction, one traffic lane will remain open at all times ensuring access for emergency service agencies.

2. Health Care

a. Existing Conditions

Maui Memorial Medical Center is the only major medical facility on the island. Acute, general and emergency care services are provided by the approximately 200-bed facility. In Hana, the Hana Medical Center provides general health care services, as well as 24-hour emergency service. For serious medical cases, Hana patients are transported to the Maui Memorial Medical Center in Wailuku.

b. Assessment of Impacts

Proposed bridge improvements are not anticipated to adversely impact the existing health care services in the Hana Region.

3. Solid Waste

a. Existing Conditions

Single-family solid waste collection service is provided by the County of Maui on a once-a-week basis. The Hana Landfill, situated off Waikoloa Road in Hana Town, accommodates all solid waste generated in the Hana region.

b. Assessment of Impacts

Prior to project construction, an acceptable solid waste management plan will be prepared for the disposal of rubble waste from the demolition work. No adverse impacts to the solid

waste capacity of the Hana region is anticipated as a result of the proposed bridge reconstruction.

4. Schools

a. Existing Conditions

The State of Hawaii, Department of Education operates two (2) public schools in the Hana region: Hana High and Elementary School and Keanae School. Hana High and Elementary School is located approximately six (6) miles to the north of the project site.

b. Assessment of Impacts

The proposed Waiohonu Bridge improvements are not anticipated to adversely impact the existing education facilities in the Hana region.

5. Recreational Resources

a. Existing Conditions

Major recreational resources in the Hana region include the County maintained Hana Ball Park, Hana Bay Beach Park in Hana Town and Koki Beach Park near Hamoa. In addition, the State of Hawaii maintains the Wainapapa State Park approximately seven (7) miles north of the subject property, while the National Park Service maintains the Oheo Gulch Facility as part of the Haleakala National Park. There are no public recreational facilities in the vicinity of the project site.

As listed in various hiking and visitor oriented books and publications, Waiohonu Pools or "Venus Pools" is located downstream of the project site. The site attracts both local and visitor crowds daily, resulting in street side parking to the north and south of Waiohonu Bridge. Stream users walk across a trail located on Hana Ranch lands (TMK (2) 1-4-12: 2) to access the lower stream areas.

b. Assessment of Impacts

The proposed project is not anticipated to adversely impact existing recreational resources in the Hana region, however, users of Waiohonu Pools or Venus Pools will be required to find alternate parking sites as construction activities commence.

L. INFRASTRUCTURE AND ANTICIPATED IMPACTS

1. Roadways

a. Existing Conditions

The Hana Highway is a two-way State Highway, serving as the main transportation arterial with rural collector road status for the Hana region. The Hana Highway is noted for its scenic beauty and historic nature, which includes 59 bridges and 8 culverts, all of which are over 50 years old. Although the historic bridges and winding nature of the highway contributes to its unique character, the roadway has many deficiencies when compared to the AASHTO "rural collector" standards.

In between Hana Town and Kaupo, the County of Maui has jurisdiction of the Hana Highway, which includes approximately 14 aging bridge structures, including the Waiohonu Bridge.

The scenic and historic qualities of the Hana Highway resulted in the roadway's designation as Hawaii's only Millennium Legacy Trail in October 1999, emphasizing the historic value of the roadway. In 2001, the Hana Highway Historic District was placed on the Hawaii State and National Register of Historic Places. The Historic District extends from Ho'alua Bridge near Huelo to Koukou'ai Bridge in the Kipahulu District. In association with its plans to replace the Papahawahawa Bridge, the County of Maui, DPWEM drafted the Hana Bridges Historic Preservation Plan, with a purpose to "provide the County of Maui with a comprehensive approach to managing its 14 bridges within the Hana Highway Historic District in consideration of their historic resource value, public safety, and Federal funding opportunities that could minimize fiscal impact to the County."

Plans for the proposed reconstruction of the Waiohonu Bridge have been completed in keeping with the guidelines and recommendations of the Hana Bridges Preservation Plan. The proposed plans represent a reconstructed bridge design which meets standard safety requirements while acknowledging the bridges unique history and design features.

b. Assessment of Impacts

No adverse impacts are anticipated to the existing roadway system as a result of the proposed bridge reconstruction project.

The temporary bridge structure will be delivered to the project site in approximately eighteen (18) 20-foot containers, each less than ten (10) tons in weight. Preliminary cost estimates for trucking the containers from Kahului Harbor to the project site are estimated at approximately $10,000.00 to $15,000.00. Delivery of the containers would be completed by a local trucking company, delivered to the site during the middle of the night in order to minimize potential impacts to local traffic operations.

2. Wastewater and Water Service

a. Existing Conditions

There is no County wastewater collection and treatment facilities in the Hana region. Accordingly, properties in the vicinity of the project site are serviced by individual wastewater systems, including cesspools and septic tanks. Water service to properties in the area are serviced by the County of Maui Department of Water Supply (DWS) via 4-inch waterlines which are suspended to the existing bridge.

b. Assessment of Impacts

All bridge improvements will be coordinated with the DWS so as to ensure minimal impacts to neighboring properties and existing water service in the vicinity of the project site. No adverse impact to wastewater or water service is anticipated as a result of the proposed bridge improvement project.

3. Drainage System

a. Existing Conditions

There are no drainage improvements in the vicinity of the project site. During rainfalls, runoff sheet flows along the roadway and flows into existing streams, gulches or gullies.

b. Assessment of Impacts

The proposed project improvements are not anticipated to adversely impact drainage capacity of the Waiohonu Stream or surrounding properties. See Appendix F.

4. Electrical and Telephone Service

a. Existing Conditions

Electrical and telephone services are provided to the site via overhead utility lines. Service providers are Maui Electric Company, Ltd. and Verizon Hawaii.

b. Assessment of Impacts

Design and construction of proposed improvements will be coordinated with individual service providers to ensure that existing service levels are not adversely impacted by proposed improvements.

IV. SOCIO-ECONOMIC CONDITIONS

A. Existing Conditions

The Hana region includes Hana Town and the neighboring coastal communities of Keanae, Kipahulu and Kaupo. Situated 55 miles east of the County seat in Wailuku, Hana Town serves as the major population center of the Hana area. The economy in Hana is primarily based on diversified agriculture, the visitor industry, government services and subsistence activities. Diversified agricultural activities include ranching, as well as the cultivation of taro and tropical fruits, flowers and foliage. Businesses, government services and visitor accommodations are centered in Hana Town.

In the 1990s, the population of Hana was 1,895, while the population for the year 2000 has been estimated at 1,867. By the year 2010, the baseline population of Hana is projected to increase to 2,012 (Socio-Economic Forecast: Phase 1 Report, May 2002).

In 1990, there were approximately 680 jobs in the Hana region, while in the year 2000, there was approximately 840. By the year 2010, the baseline number of jobs in Hana is anticipated to be approximately 882 (Socio-Economic Forecast: Phase 1 Report, May 2002).

B. Assessment of Impacts

During the proposed reconstruction phase of the project, benefits will accrue to the local economy as a direct result of construction expenditures. Beneficial impacts include contributions made in the form of wages, salaries and sales taxes, as well as goods and services purchased from local vendors. In the long term, the proposed project is not anticipated to adversely impact the economic climate in the Hana region.

V. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

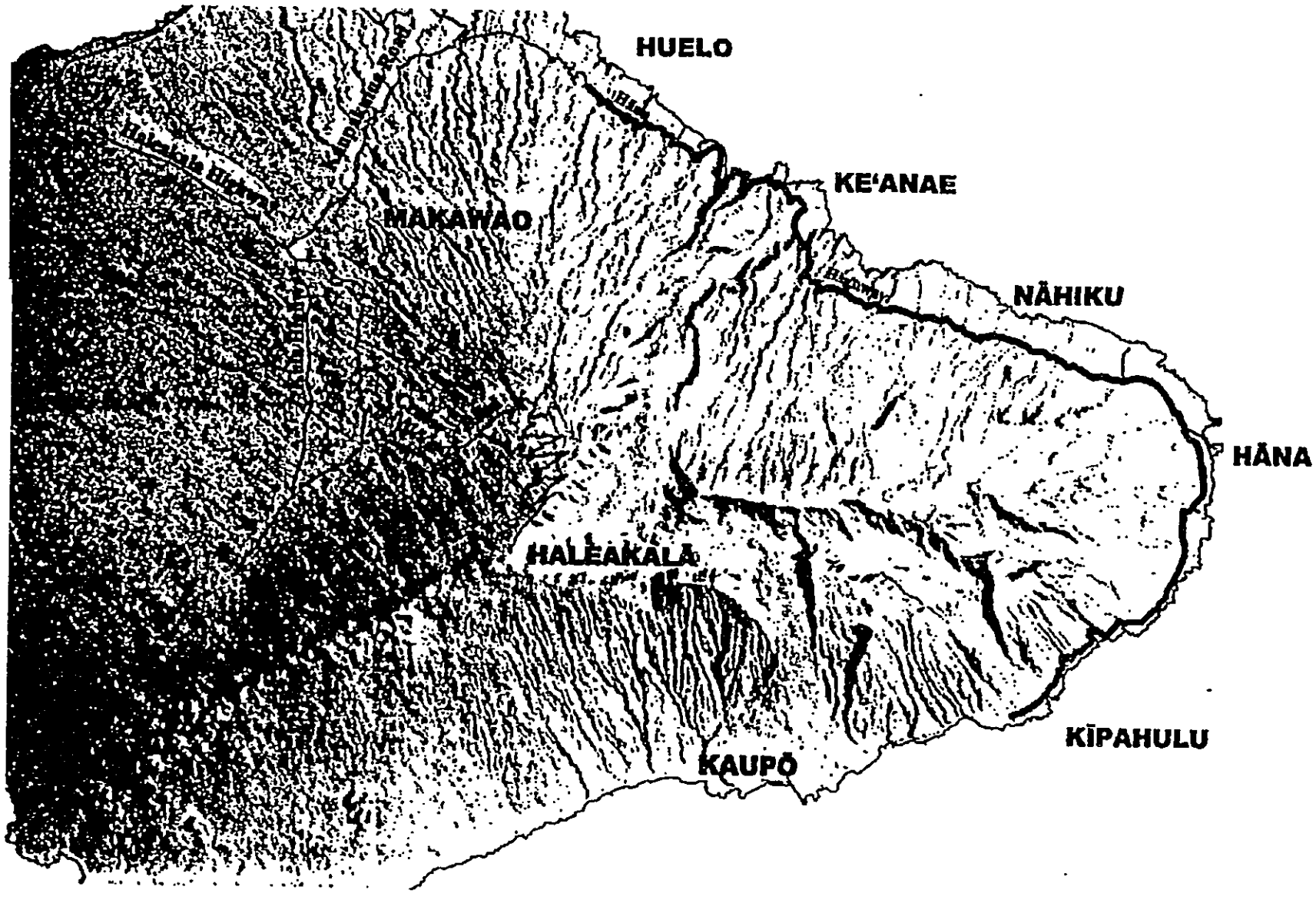
A. Hana Highway Historic District

The Hana Highway Historic District was established in the year 2001, when the Maui County Cultural Resources Commission nominated the Historic District to the Hawaii State and National Register of Historic Places. Following this nomination, the Historic District was listed on the State Register and National Register in March and June, respectively, of the same year.

The Hana Highway Historic District extends from Ho'alua Bridge near Huelo to Koukou'ai Bridge in Kipahulu. See Figure 8. The District includes 59 bridges and 8 culverts all over 50 years old. Of the 67 structures, 51 are located along the State of Hawaii portion of Hana Highway, which terminates in Hana Town. South of Hana Town, the Hana Highway is under County of Maui (COM) jurisdiction, which includes 14 bridges. See Figure 9.

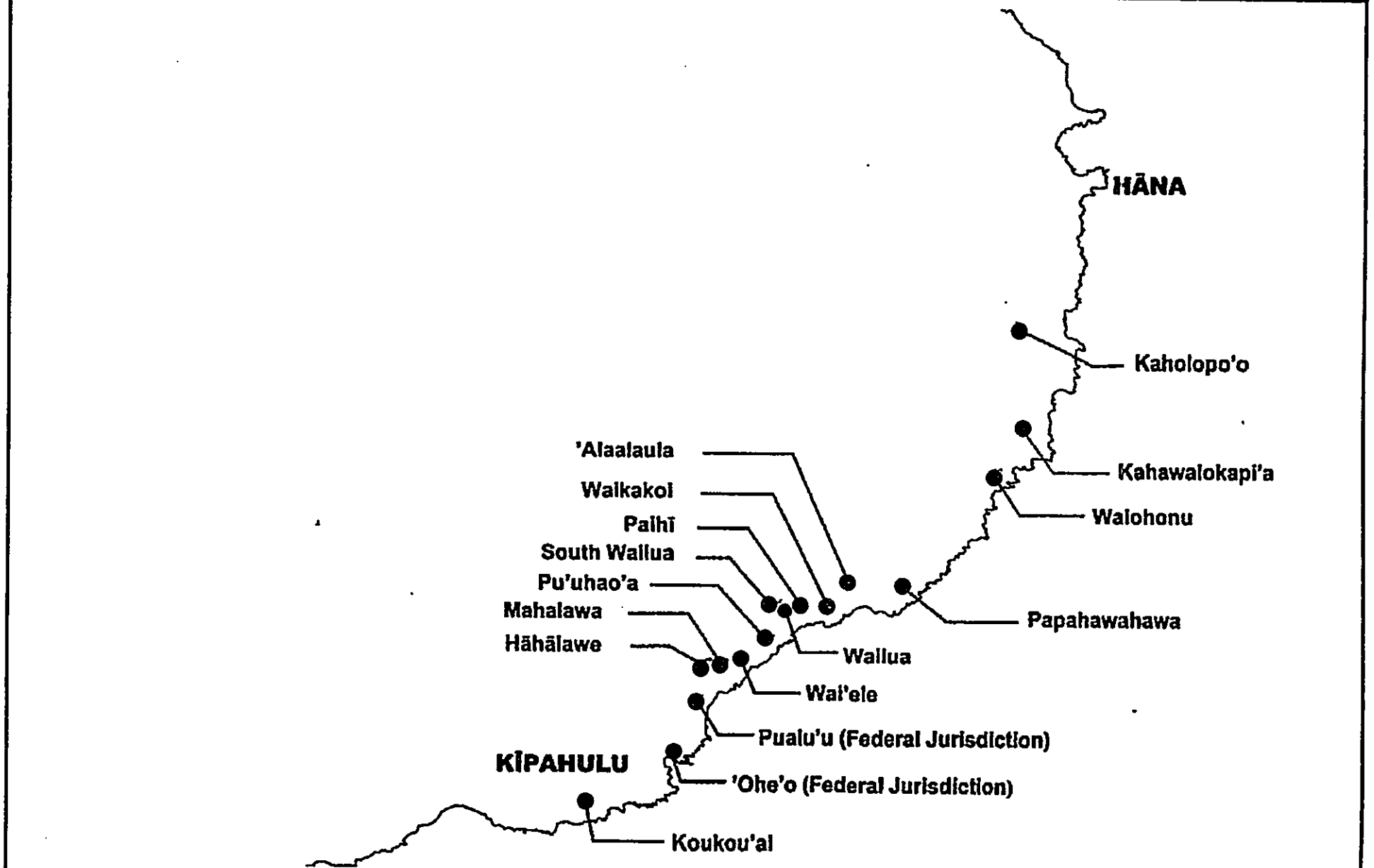
The purpose of the Hana Bridges Historic Preservation Plan (Preservation Plan) is to provide the COM with a comprehensive approach to managing the 14 bridges within the Hana Highway Historic District, "given the historic value of the bridges, public safety concerns and Federal funding opportunities that could minimize fiscal impact to the County" (Wilson Okamoto & Associates, December, 2001). Further, the Preservation Plan includes management recommendations which seek to achieve a balance of historic preservation, public safety and budgetary considerations for the COM.

As stated in the Preservation Plan, the character of the Hana Highway Historic District is defined not only by individually significant bridges within the District, but by the contributing aesthetic characteristics of all the bridges combined. Bridges along the Hana Highway are defined by visible approaches, including narrow single-lane decks, unique railings and bridge inscriptions. According to



Source: Wilson Okamoto & Associates, Inc. (December 2001)

WAIOHONU BRIDGE REPLACEMENT	FIGURE 8 HANA HIGHWAY HISTORIC DISTRICT	Prepared By: Sato & Associates, Inc.



Source: Wilson Okamoto & Associates, Inc. (December 2001)

WAIOHONU BRIDGE REPLACEMENT	FIGURE 9 COUNTY BRIDGES IN THE HANA HIGHWAY HISTORIC DISTRICT	Prepared By: Sato & Associates, Inc.

the Preservation Plan, "the historic resource value of the bridges is associated with their age, having survived more than a half-century in the region and island they serve" (Wilson Okamoto & Associates, December, 2001).

However, the historic nature of the bridge structures also poses serious public safety issues for the COM. The historic bridges were constructed more than a half-century ago, at a time when the requirements of modern day traffic flows, carrying capacities and load ratings were virtually inconceivable. Further, the fact that the bridges have been in service for more than 50 years has also contributed to significant deficiencies in structural integrity.

As required by mandatory federal standards, the COM periodically conducts bridge inspections to assess compliance with National Bridge Inspection Standards. The Sufficiency Rating is an overall numerical rating which assesses the structural and functional qualities of a bridge in relation to the roadway it serves. A poor sufficiency rating can result in a bridge assessment as Structurally Deficient or Functionally Obsolete.

A Structurally Deficient bridge is one that has been restricted to lighter vehicles, requires immediate rehabilitation to remain open, or has been closed. A Functionally Obsolete bridge is one in which the deck geometry, load capacity, clearance, or approach road alignment no longer meets the usual criteria for the transportation system it serves.

Of the County's fourteen bridges, all fourteen have been recently assessed as Functionally Obsolete due to inadequate load capacity, narrow lane widths and other deficiencies. Further, ten of the bridges were assessed as Structurally Deficient, including the Waiohonu Bridge.

In consideration of the existing bridge conditions noted above, the Preservation Plan advanced the following findings:

1. The ten Structurally Deficient County bridges require immediate attention, either by replacement, rehabilitation or temporary shoring. Keeping the bridges in service in their present condition is an immediate public safety concern and significant tort liability risk for the County;

2. Federal Aid should be pursued to address the structurally deficient bridges; and

3. The remaining four bridges which are not currently rated as Structurally Deficient should be kept in service with available maintenance.

The overall design recommendation advanced by the Preservation Plan includes eleven recommendations to improve public safety while preserving the historic nature of the County's fourteen historic bridge structures. In drafting the recommendations, government agencies, community groups and interested parties were consulted. Final recommendations are as follows:

1. Replace or widen bridge decks to meet the 16-foot railing-to-railing width under consideration for design exception on a case-by-case basis by the State DOT and the Federal Highways Administration;

2. For bridge railings to be replaced, use a crash-tested railing design that has been cosmetically modified to resemble the existing railing. For existing railings to be preserved in-place, install freestanding steel w-beam guardrail, or other comparable protection, inside the existing railing. The minimum height should be 32 inches;

3. Replace the understructures if they are not visible from the primary view from the highway;

4. Preserve or reconstruct understructures to resemble the downstream side view (elevation view) of bridges for which this is the primary view from the highway;

5. Evaluate the use of composite materials for preserving the understructure of bridges for which such technology may be applicable;

6. Reserve rubble from demolished concrete rubble masonry (CRM) walls and abutments for use in re-facing replacement structures;

7. Preserve existing mid-span supports in place as non-load bearing structures unless they limit the hydraulic capacity of the bridge to pass the design storm flow;

8. Provide new rock wall guard rails along the approaches to the bridge, terminating as freestanding structures adjacent to bridge railings. Rock-wall guardrails will be a "crash-tested" design that may alternatively be constructed as lava rock with necessary reinforcements, a reinforced concrete guardrail faced with lava rock or a reinforced concrete guardrail finished to appear as lava rock. If appropriate, rubble from existing CRM guardrails will be reserved for potential use in constructing the new rock wall guardrails;

9. Provide all required signage, including those for single-lane operations;

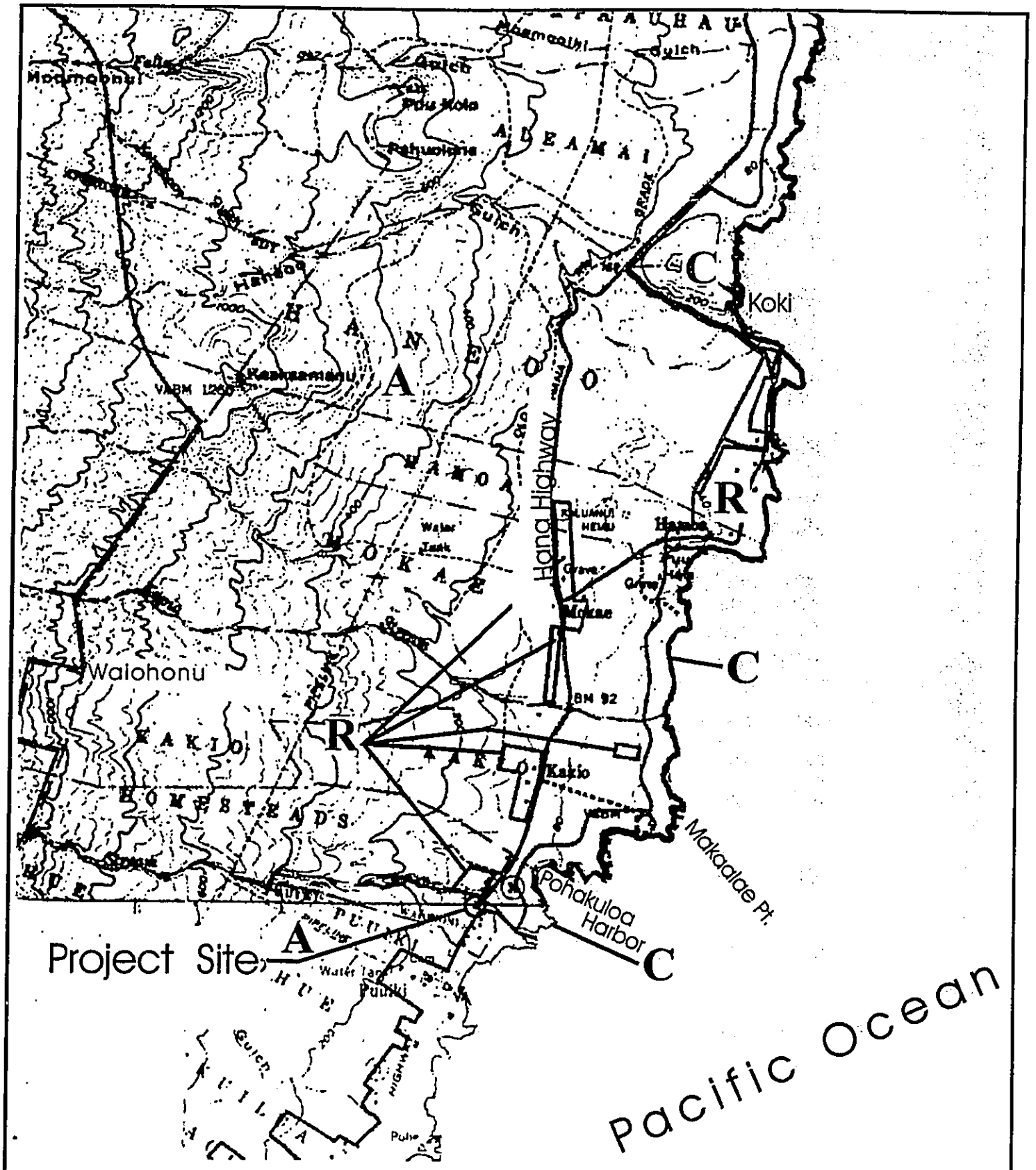
10. Provide temporary by-pass measures, if feasible, to maintain traffic flow during construction; and

11. Prepare photographic documentation of all bridges prior to demolition or modification in accordance with the standards of the Historic American Engineering Record (HAER) and the Historic American Building Survey (HABS).

The proposed Waiohonu Bridge project is being undertaken in the context of the Preservation Plan. Design guidelines, as well as required documentation for historic district mitigation, will be followed.

B. State Land Use District

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes the four (4) major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural" and "Conservation". The proposed roadway construction is designated for lands located within the existing right-of-way, with underlying lands designated as "Agriculture". See Figure 10. The proposed reconstruction project is a land use permitted within the Agricultural District. It is noted that under current plans, the DPWEM intends to utilize a temporary bridge structure, which would



Source: USGS

WAIOHONU BRIDGE REPLACEMENT	FIGURE 10 STATE LAND USE DISTRICT CLASSIFICATIONS 1" = 2000'	Prepared By: Sato & Associates, Inc.

traverse lands which are located in the "Rural" District. The proposed temporary bridge structure is a land use permitted within the Rural District.

C. Maui County General Plan

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter, the purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and the development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development. The proposed action is in keeping with transportation objectives and policies of the Maui County General Plan.

Objective:

- To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.

Policy:

- Ensure that transportation facilities are anticipated and programmed for construction in order to support planned growth.

D. Hana Community Plan

Within the County of Maui, there are nine (9) community plan regions. From a General Plan implementation standpoint, each region is governed by a community plan which sets forth desired land use patterns, as well as goals, objectives, policies and implementing actions for a number of functional areas including infrastructure-related parameters. The nine (9) regions are: Molokai, Lanai, West Maui, Wailuku, Kahului, Kihei-Makena, Makawao-Pukalani-Kula,

Paia-Haiku, Hana and Kahoolawe. The project corridor is located within the Hana Community Plan region. See Figure 11.

The proposed project is consistent with the Goals, Objectives, Policies and Implementing Actions for the Physical Infrastructure of the Hana Community Plan.

Objective and Policy:

- Balance traffic flow and safety requirements with the preservation of the Hana region's historic bridges

Implementing Action:

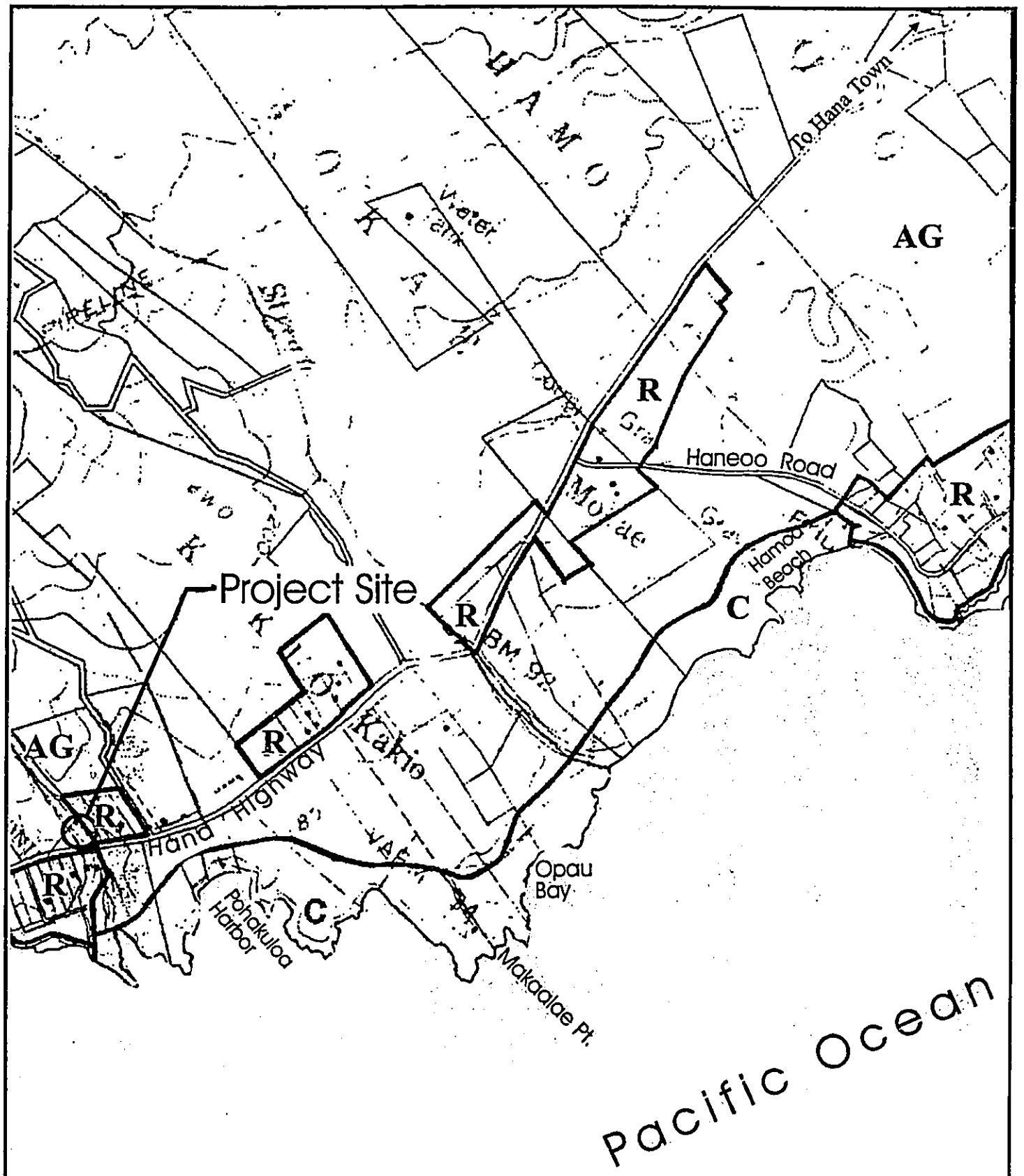
- Improve Hana Highway to allow safe passage of two-way vehicular traffic.

E. Zoning

Permitted uses and performance standards are set forth by Title 19 of the Maui County Codes relating to zoning. Infrastructural systems, including roadway and supporting structures, are permitted in each of the County zoning districts. Inasmuch as the proposed roadway lies within the County right-of-way, there are no specific zoning standards or requirements which would require discretionary review from the Maui Planning Commission or the Maui County Council.

F. Coastal Zone Management Objectives and Policies

The proposed project site is located on the mauka (western) edge of the Special Management Area (SMA). Pursuant to Chapter 205A, Hawaii Revised Statutes, and the SMA Rules and Regulations for the Maui Planning



Source: County of Maui, Department of Planning

WAIOHONU BRIDGE REPLACEMENT	FIGURE 11 Community Plan Designations 1" = 2000'	Prepared By: Sato & Associates, Inc.

Commission, actions proposed within the SMA are evaluated with respect to SMA objectives, policies and guidelines. This section addresses the proposed action as related to applicable coastal zone management considerations, as set forth in Chapter 205A and the Rules and Regulations of the Maui Planing Commission.

(1) Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

(A) Improve coordination and funding of coastal recreational planning and management; and

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of Section 46-6, HRS.

Response: The proposed project is not anticipated to adversely impact existing shoreline recreational activities or coastal access ways. An access trail located to the north of the project site is currently utilized by Hana fishermen, however, the trail will remain unaffected by the bridge reconstruction.

(2) **Historic Resources**

Objective:

Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

(A) Identify and analyze significant archeological resources;
(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and
(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: The proposed reconstruction of the Waiohonu Bridge structure will be completed in keeping with the guidelines and objectives of the Final Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District. Plans for reconstruction of the bridge have been designed to improve public safety while preserving the historic nature of the Waiohonu Bridge.

(3) Scenic and Open Space Resources

Objectives:

Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

(A) Identify valued scenic resources in the coastal zone management area;

(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

(D) Encourage those developments that are not coastal dependent to locate in inland areas.

Response: The proposed project will not impact shoreline views or open space resources. Consistent with the recommended objectives of the Final Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District, project plans have been designed to preserve and maintain the existing visual character of the Waiohonu Bridge structure.

(4) Coastal Ecosystems

Objective:

Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

(B) Improve the technical basis for natural resource management;

(C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

(D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

(E) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Response: The proposed project will be limited to the reconstruction of an existing bridge structure. Appropriate BMPs will be utilized in order to preserve the integrity of the nearby coastal ecosystems.

(5) Economic Uses

Objectives:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

(A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

(i) Use of presently designated locations is not feasible;
(ii) Adverse environmental effects are minimized; and
(iii) The development is important to the State's economy.

Response: The proposed reconstruction of Waiohonu Bridge will have a short-term beneficial impact on the economy during construction by providing construction-related employment. In the long term, the project will improve the stability of the roadway facility, limiting the potential for a bridge washout or structural failure.

(6) **Coastal Hazards**

Objectives:

Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies:

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoi nt source pollution hazards;
(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoi-nt pollution hazards;
(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and
(D) Prevent coastal flooding from inland projects.

Response: No short-term impacts are anticipated during construction-related activities. Appropriate erosion control measures designed to minimize soil loss and erosion will be utilized, and proposed improvements will be designed to conform with all applicable flood requirements. In the long term, the reconstructed bridge will reduce the region's susceptibility to significant flood damage.

(7) **Managing Development**

Objectives:

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

(A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

(B) Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and

(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: In compliance with the requirements of Chapter 343, Hawaii Revised Statutes, this Environmental Assessment has been prepared to facilitate public understanding and involvement with the proposed project. In addition, all applicable State and County requirements will be adhered in the design and reconstruction of the bridge structure.

(8) **Public Participation**

Objectives:

Stimulate public awareness, education, and participation in coastal management.

Policies:

(A) Promote public involvement in coastal zone management processes;

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact,

and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

(C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts

Response: As previously noted, public awareness of the project is being promoted through the Environmental Assessment process, as well as the County's SMA permitting and review process. In addition, a community meeting was held by the DPWEM at the Hana High and Elementary School on May 13, 2002 to discuss and receive comments on the proposed action. The proposed project is not contrary to the objectives of public awareness, education and participation.

(9) Beach Protection

Objectives:

Protect beaches for public use and recreation.

Policies:

(A) Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: During construction activities, appropriate BMPs will be utilized to ensure the downstream coastal environment is not adversely impacted.

(10) Marine Resources

Objectives:

Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

(A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
(B) Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;
(C) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;
(D) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and
(E) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: The proposed bridge reconstruction is not anticipated to adversely impact coastal marine resources.

VI. ALTERNATIVES TO THE PROPOSED ACTION

A. Raised Bridge Alternative

The preliminary drainage study for the Waiohonu Bridge calculates a total discharge for the Waiohonu Watershed to be approximately 16,900 cfs for the 100 year storm. This volume of discharge will crest over the roadway by approximately 2.5 feet. Raising the bridge was an alternative that was considered. This alternative would be impractical, since this would also raise the approach to the bridge and significantly affect access to the driveways for the residences adjacent to the bridge. This would also limit the sightlines at the bridge and create a hazardous condition for both vehicles and pedestrians, compounded by the fact that this bridge will remain a one-lane bridge.

B. Bridge Rehabilitation Alternative

Rehabilitation of the existing bridge in its current location was considered. Since there are no plans for the construction of the existing bridge and it would be difficult to determine the actual load capacity of the bridge without extensive probing and possible demolition of portions of the bridge, rails, piers and abutment, several assumptions had to be made in the design for rehabilitating the bridge.

Assumptions include: (1) the existing piers are unreinforced; (2) the existing railings have minimal reinforcing; (3) the lateral load capacity of the railings are substantially less than the required 27,000 pounds; and (4) the piers are built directly on the hard basalt streambed.

The advantages of rehabilitating the bridge are that the construction cost may be slightly lower than building of a new bridge, the appearance of the piers and

abutment would be preserved, and the construction time may be slightly shorter.

The disadvantages of rehabilitating the bridge would be that the County of Maui's cost will be higher because Federal participation would be limited; the overtopping problem will remain, because the stream channel conditions would remain unchanged and there would be no improvement in stream-flow capacity. Additionally, although the bridge repairs would be made with new and improved materials, the remaining portions of the bridge will still be 87 years old and the remaining life will be substantially shorter than a new bridge. On-going maintenance of the bridge would also be required to ensure its safety.

The portions of the existing bridge that will remain are the piers, the beams, and the bridge decking. These areas can only be seen from the upstream and downstream sides of the bridge. The areas of the bridge that are exposed to traffic, such as the railings and top deck, would be new construction and its appearance would be the same as if a new bridge were constructed in its entirety.

C. No Action Alternative

Under the no action alternative, no new bridge replacement or repair would be pursued. Environmental impacts would be avoided, the need for permits would be precluded, and construction costs spared, although the funds allocated for this bridge replacement would be used to replace another Maui County bridge. Resources will continue to be required for the inspection and regular maintenance of the bridge to maximize its useful life. The bridge would continue to degrade, and in time, may need to be closed should it no longer provide safe vehicular support. In addition, postponing the bridge replacement project could also raise construction costs by approximately five percent per year.

D. Preferred Alternative

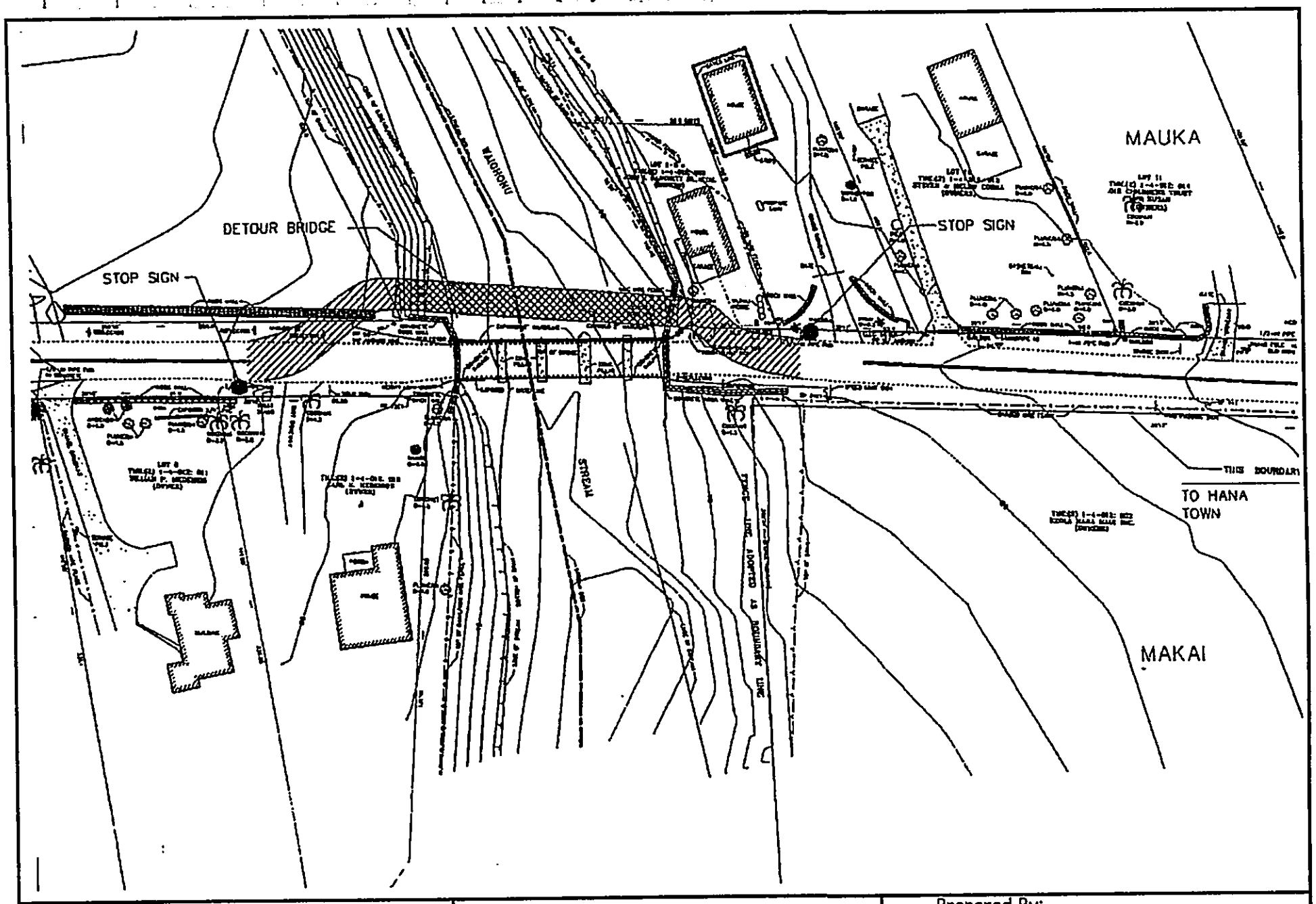
The current replacement represents the most viable design alternative as based on cost, design and preservation factors. To implement the Preferred Alternative, alternate roadway detour options must be considered. Accordingly, the two following options were considered in conjunction with the Preferred Alternative.

1. Makai Detour Road Alternative

The makai detour alternative is the selected option for the proposed project. Refer to Figure 5. This alternative would involve the realignment of the roadway approaches to a temporary bridge spanning the Waiohonu Stream on the makai side of Hana Highway. Vehicles would be detoured to the temporary crossing while the existing bridge is demolished and the new bridge is constructed. The advantage to this alternative is that it would eliminate closure of the roadway, vehicles would not be required to negotiate through an active construction area, and the realigned approaches do not obstruct the existing residential driveways.

2. Mauka Detour Road Alternative

This alternative would be similar to Alternative 1, except that the detour road would be placed on the mauka side of Piilani Highway. This alternative was not selected, however, because it would create a hazardous condition for the occupants of the residence that is located in close proximity of the Hana Highway, the detour road would be directly in front of a residence and the realigned approaches would interfere with their driveway. See Figure 12.



WAIOHONU BRIDGE REPLACEMENT	FIGURE 12 TEMPORARY DETOUR ROAD AND BRIDGE	Prepared By: Sato & Associates, Inc.

VII. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Project construction will result in certain unavoidable construction-related impacts, including noise-generated impacts and air quality impacts associated with the operation of construction equipment. Air quality will also be impacted by dust generated from site work. The construction-related impacts will be temporary and mitigated through implementation of appropriate BMPs. A copy of the General Best Management Practice Plan for the proposed project is attached herein as Appendix G.

In the long term, destruction of the original Waiohonu Bridge is required to ensure the general safety and hydraulic conditions of the bridge structure. However, in order to mitigate the loss of the historic resource, the reconstructed bridge will be designed in accordance with the Hana Bridges Historic Preservation Plan. Specifically, the reconstructed bridge will maintain a similar design concept as the original structure, featuring a width increase from 15.4 feet to 16 feet (between railings). The existing railing design will be maintained, with a slight increase in height from 30 inches to 32 inches. The railing style will be open concrete blaustrade, designed to resemble the original railings. A new concrete abutment and wing walls will also be constructed, concrete faced with rubble from the original bridge structure. Finally, a new guardrail (as required by AASHTO) will be constructed, utilizing a rock wall design.

The specific design parameters noted above will be incorporated into the project design in an effort to mitigate the adverse effects that will result from the demolition of the existing Waiohonu Bridge structure.

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The reconstruction of the Waiohonu Bridge is required to upgrade the safety and hydraulic conditions of the current bridge structure. The action will require the demolition of an existing bridge which is noted for its historic and intrinsic qualities. In addition, the proposed action will involve the commitment of fuel, labor, funding and material resources. Given the need to upgrade the conditions of the deteriorating bridge structure and the need to maintain the functional utility of the region's primary roadway, the commitment of resources is justified based on the eventual benefits realized through completion of the bridge reconstruction project.

IX. REQUIRED PERMITS AND APPROVALS

A. Federal

A Department of the Army (DA) permit will be required for this project, as outlined in a letter from George P. Young, P.E. Chief, Regulatory Branch of the DA. Refer to Chapter XIII.

B. State of Hawaii

The DLNR, Commission on Water Resource Management (CWRM) has determined that a Stream Channel Alteration Permit (SCAP) will be required for the project, since the proposed work involves the removal of existing piers, modification of bridge abutments and construction of a temporary detour roadway and bridge. Refer to Chapter XIII.

Pursuant to Section 401 of the Clean Water Act, a Water Quality Certification from the Department of Health will be required. Refer to Chapter XIII.

As the proposed project includes the use of federal funding, the requirements of Section 106 of the National Historic Preservation Act are in effect. As such, the DLNR office of the State Historic Preservation Division (SHPD) has indicated that a Memorandum of Agreement (MOA) between the DPWEM and all interested parties will be necessary in order to mitigate potential adverse impacts associated with the demolition of a historic structure. The DPWEM is currently in the process of administering the Section 106 review process and will execute a MOA.

A right of entry will be required from the State of Hawaii, DLNR, Land Division and the private land owners adjacent to the bridge for the temporary bridge and any work area outside of the roadway right-of-way.

X. FINDINGS AND CONCLUSIONS

Based on this Environmental Assessment, it is anticipated that the project will not have a significant effect on the environment, as defined by Section 11-200-12, Hawaii Administrative Rules, Department of Health.

The proposed project has been evaluated in accordance with the Significance Criteria of Section 11-200-12 of the Hawaii Administrative Rules. Based on the following analysis, the proposed project is not anticipated to result in any significant impacts. Discussion of project conformance to the criteria is noted as follows:

1. No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resource Would Occur as a Result of the Proposed Project

The proposed project will be limited to reconstruction of an existing bridge structure. No identified rare, endangered or threatened species of flora, fauna or avifauna are located within the vicinity of the project site.

North of the project area, a shoreline access trail provides Hana fishermen access to the shoreline makai of the project site. Proposed improvements will not impact existing access ways or affect cultural resources.

From an archaeological standpoint, the proposed project will be limited to the roadway right-of-way and immediate adjacent areas, and is not anticipated to adversely impact archaeological or cultural materials. However, should significant materials be encountered during construction, work in the immediate vicinity of the find will cease and the SHPD will be notified to ensure compliance with Chapter 6E.

In order to mitigate the adverse impacts related to reconstruction of the original Waiohonu Bridge structure, the DPWEM has presented a bridge design in accordance with the recommendations of the Final Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District. Further, a Memorandum of Agreement (MOA), as required by Section 106 of the National Historic Preservation Act is being prepared for execution between the FHWA and SHPD. The MOA will ensure the character defining traits of the original Waiohonu Bridge structure are retained in the reconstruction project.

2. <u>The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment</u>

The project site is situated along lands within an existing roadway right-of-way. The commitment of land necessary for the bridge reconstruction is not anticipated to curtail the range of beneficial uses of the environment.

3. <u>The Proposed Action Does Not Conflict with the State's Long-term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, Hawaii Revised Statutes</u>

The State Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statutes. The proposed action is not contrary to the policies and guidelines set forth in Chapter 344, HRS.

4. <u>The Economic or Social Welfare of the Community or State Would Not be Substantially Affected</u>

The proposed project will have short-term economic benefits to the Hana economy during the construction phase. There are no adverse long-term economic or social welfare impacts anticipated as a result of project implementation.

5. The Proposed Action Does Not Affect Public Health

No negative impacts to the public's health and welfare are anticipated as a result of the proposed action.

6. No Substantial Secondary Impacts, Such as Population Changes or Effects on Public Facilities are Anticipated

The proposed project is not anticipated to have an effect upon the region's population base and should not place new demands on the regional public facilities.

7. No Substantial Degradation of Environmental Quality is Anticipated

During project implementation, appropriate environmental mitigation measures will be utilized to ensure that potential adverse environmental effects are mitigated. No substantial degradation of the environment is anticipated.

8. The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Effects on the Environment

The proposed project is not part of or linked to a larger action. The proposed project is not anticipated to create or contribute to any significant long-term environmental effects.

9. No Rare, Threatened or Endangered Species or Their Habitats Would be Adversely Affected by the Proposed Action

There are no known or identified habitats of rare, threatened or endangered species of flora or fauna in the vicinity of the project site. Given the scale and

location of the bridge reconstruction, no habitats or natural environments are anticipated to be adversely affected by the proposed project.

10. Air Quality, Water Quality or Ambient Noise Levels Would Not be Detrimentally Affected by the Proposed Project

Appropriate environmental mitigation measures will be implemented during project construction to ensure that adverse environmental impacts on air quality and ambient noise levels are minimized. The Waiohonu Stream flows intermittently, nevertheless, appropriate BMPs will be utilized to ensure potential impacts to water quality are avoided.

In the long term, the proposed project is not anticipated to have a significant impact on air quality, water quality or noise parameters.

11. The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such as Flood Plains, Tsunami Zones, Erosion-prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters

The subject property is located within the vicinity of the Waiohonu Stream, which flows intermittently. Prior to construction activities, a Department of the Army (DA) permit will be required. In addition, a Stream Channel Alteration Permit (SCAP) from the Department of Land and Natural Resources, Commission on Water Resource Management will be required, as will a Water Quality Certification from the Department of Health. Through governmental guidance and implementation of said permitting requirements, parameters of the proposed project will be such that the potential for adverse impacts is minimized. Further, use of appropriate BMPs during construction will also reduce potential for adverse impacts to water quality.

12. The Proposed Action Would Not Substantially Affect Scenic Vistas and Viewplanes Identified in County or State Plans or Studies

The proposed project is not anticipated to adversely impact scenic vistas or viewplanes in the project vicinity. In addition, the reconstruction designs are aimed at preserving the visual character of the Waiohonu Bridge.

13. The Proposed Action Would Not Require Substantial Energy Consumption

The proposed project will result in the short-term commitment of fuel for equipment, vehicles and machinery during construction activities. However, the short-term energy demand is not considered substantive or excessive within the context of the region's overall energy consumption. In the long term, the project is not anticipated to create additional demands for energy consumption.

Based on the foregoing findings, it is concluded that the proposed action will not result in significant adverse impacts.

XI. LIST OF AGENCIES AND PARTIES CONSULTED

The following agencies were consulted during the pre-assessment phase of the Environmental Assessment:

Federal

Department of the Army, U.S. Army Engineer District, Honolulu

U.S. Department of the Interiors, National Park Service, Haleakala National Park

U.S. Department of the Interiors, U.S. Geological Survey, Water Resources Discipline

State of Hawaii

Department of Business, Economic Development and Tourism, Land Use Commission

Department of Health, Clean Water Branch

Department of Land and Natural Resources, Historic Preservation Division

Department of Land and Natural Resources, Commission on Water Resources Management

Department of Land and Natural Resources, Land Division

Department of Land and Natural Resources, Division of Aquatic Resources

Natural Resources Conservation Service

Office of Environmental Quality Control

County of Maui

Department of Public Works and Environmental Management

Department of Planning

Department of Fire Control

Department of Water Supply

Police Department

XII. LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

This section includes comment letters received during the early consultation phase of EA preparation. Responses to substantive comments are also incorporated in this section.

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF:

April 16, 2002

Regulatory Branch

Mr. Clyde H. Morimoto
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

This letter responds to your request for our comments concerning the proposed Waiohonu Bridge Replacement project, dated April 8, 2002. Based on the information you provided I have determined that a Department of the Army (DA) permit will be required for this project. Please place us on the mailing list for the Draft Environmental Assessment, and include cross sectional views of the new bridge and the by-pass alternatives, showing their relationship to the stream bottom and ordinary high water line.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200200268.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

George P. Young, P.E., Chief
Regulatory Branch
Department of the Army, Engineer District
Fort Shafter, HI 96858-5440

Subject: Waiohonu Bridge Replacement, Hana Maui

Dear Mr. Young:

Thank you for your comment letter dated April 16, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

Necessary permitting for the subject project will include a Department of the Army (DA) permit. In addition, a copy of the Draft Environmental Assessment (EA) will be provided to your office. We will also provide your office with cross sectional views of the proposed bridge structure and the bypass alternatives (including their relationship to the stream bottom and ordinary high water line).

Thank you for your interest in this important project . Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\army.ltr

United States Department of the Interior

NATIONAL PARK SERVICE
Haleakalā National Park
P.O. Box 369
Makawao, Maui, Hawai'i 96768

IN REPLY REFER TO

April 20, 2002

Mr. Clyde Morimoto
Project Manager
Sato & Associates, Inc.
2115 Wells Street
Wailuku, HI 96793

Dear Mr. Morimoto:

Thank you for your April 8 letter requesting comments on the Waiohonu Bridge replacement proposal.

An important part of a visitor's experience traveling to the Kīpahulu/Ka'apahu sections of Haleakalā National Park, are the many unique, historic bridges that are traversed along the way. The National Park Service is keenly interested in how the Hāna Highway bridges can remain safe without destroying their historic qualities.

We look forward to receiving the draft Environmental Assessment to review. In the EA, as alternatives, we ask that you fully analyze all methods available for bridge preservation and strengthening that don't require complete reconstruction. For example, enclosed is a report on how Fyfe Co. preserved the 75-year old historic Woodland Viaduct Arch Bridge. Using fiber-reinforced-polymer composite materials the preservation/strengthening project reportedly saved the county and state between $16 & $26 million.

We note that on Figure 2, *County Bridges in the Hāna Highway Historic District,* that 'Ohe'o and Pualu'u Bridges are listed as under federal jurisdiction. Haleakalā Nat'l Park has never considered these bridges as the responsibility of the federal government and request the County of Maui mail us the legal document on which this claim is based so we can have it reviewed by our Department of Justice Solicitor in Oakland, California.

Sincerely,

Donald W. Reeser
Superintendent

cc: Joe Krueger, County of Maui

Fyfe Co. LLC
The Fibrwrap® Company

Project UPDATE

Woodland Viaduct Arch Bridge

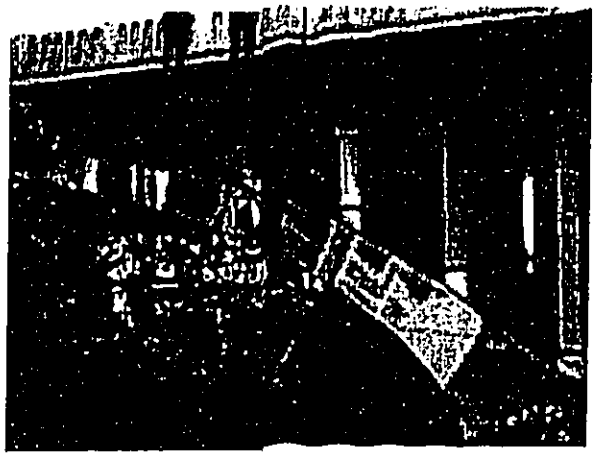
Owner: New York Department of Transportation

Location: Westchester County, New York, USA

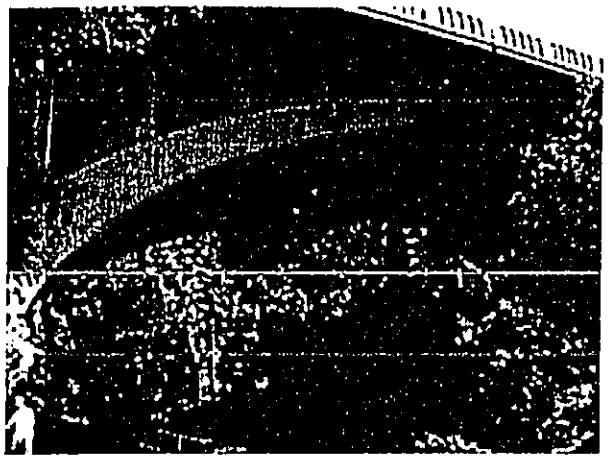
Contractor: Fibrwrap Construction, Inc.

Completion Date: July 2000

Description: A 75 - year old (constructed between 1906 and 1924) concrete open spandrel arch bridge carrying the Bronx River Parkway over the Bronx River and the Metro-North Railroad. Historically, it was the first modern parkway in the world.The main span consists of four large arch ribs with spandrel columns projecting up to the floor beams which support the deck structure. Threats to widen and straighten the roadway at the expense of adjoining parkland and historic resources landed it on the 11 most endangered list.



Problem: Due to severe deterioration of the superstructure, it was originally decided to replace the deck, floor beams, and a few columns. Subsequent



analysis indicated that all of the arches and columns would be vulnerable to a seismic event. The capacity/demand ratios for the arches are about 0.5, while the columns are rated at 0.

Solution: It was decided upon to completely replace all columns on the arches, use pin connections for the new columns and wrap the arches with fiber-reinforced-polymer composite materials.

Benefits: The Tyfo® Fibrwrap® provided the confinement necessary to increase ductility of the arches and enable them to survive a seismic event. In addition to seismic strengthening, the composite wrap also protects the arches against the effects of the environment, and can be finished to match existing concrete that is to remain in place.

An excerpt from the most endangered historic sites web page stated that the Fibrwrap® retrofit would "save the County and State an estimated $16 to $26 million over new construction."

[Back to Project Updates]

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OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Donald W. Reeser, Superintendent
United States Department of the Interior
National Park Service, Haleakala National Park
P.O. Box 369
Makawao, Hawaii 96768

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Mr. Reeser:

Thank you for your comment letter dated April 20, 2002 regarding the subject project. In response to the comment provided, we would like to note the following.

The Draft Environmental Assessment (EA) will examine various preservation and strengthening alternatives for the necessary improvements of Waiohonu Bridge.

Please note that the County of Maui Department of Public Works and Waste Management will contact you directly to discuss jurisdiction of the bridges in Haleakala National Park.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\usdi.ltr

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

WATER RESOURCES DISCIPLINE
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813
Phone: (808) 587-2400/Fax: (808) 587-2401

April 23, 2002

Mr. Clyde Morimoto
Sato & Associates, Inc.
2115 Wells Street
Wailuku, HI 96793

Dear Mr. Morimoto:

Regarding your Waiohonu Bridge replacement project, we thought it might be relevant to bring to your attention the fact that the U.S. Geological Survey currently maintains two crest-stage gages (502400 and 502800) in the area between Kipahulu and Hana. We also have data from three other continuous-record gages (501000, 501200, and 502000) near Kipahulu that are no longer in operation.

We will soon begin work on a project to update flood-frequency estimates throughout the state. The results of the study should be available in 2004.

If you have any questions, or are interested in obtaining our data, please feel free to contact Delwyn Oki at 587-2433.

Sincerely,

for GG Tribble

Gordon Tribble
District Chief

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Gordon Tribble, District Chief
United States Department of the Interior
U.S. Geological Survey
Water Resources Discipline
677 Ala Moana Blouevard, Suite 415
Honolulu, Hawaii 96813

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Mr. Tribble:

Thank you for your comment letter dated April 23, 2002 regarding the subject project. We look forward to reviewing the project findings of your updated flood frequency estimates for the State of Hawaii.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\usgs.ltr

Subject: Waiohonu Bridge Replacement - Pre-Assessment Consultation letter dated 4/8/02
From: "Domingo Galicinao" <Domingo.Galicinao@igate.fhwa.dot.gov>
Date: Tue, 23 Apr 2002 14:40:55 -0400
To: <joe.krueger@co.maui.hi.us>, <sean_hiraoka@exec.state.hi.us>, <maui@satoandassociates.com>
CC: <Lloyd.Lee@co.maui.hi.us>

Clyde -
We appreciate the opportunity to comments at this early stage. I have the following comments for your Pre-Assessment Consultation:

1. Please have your structural engineer evaluate whether it would be feasible to build the bridge without a detour bridge, such as building the new bridge half at a time. The detour bridge have been an expensive item for these one lane bridge replacements.

2. Prepare and submit a design exception request for the one lane bridge approval to HDOT.

3. It would be preferable to minimize the number of new bridge piers to optimize the hydraulic design and believe there is no need to retain the old pier segments unless there is a compelling need for retaining them such as a historically assessed value.

4. I know that you are already aware of this but as a reminder you should begin coordination as early as possible with SHPO, Maui CRC, AHEM.

5. In the document it would be useful to address water quality issues and possible resulting flooding of adjacent properties in a storm event during construction, that may be a result of the detour bridge if it would be a constriction. It appears that a detour bridge is being considered on the makai side which would affect encroachment into a private residence, so impacts and mitigation should be addressed in document.

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Abraham Wong, Division Administrator
Federal Highway, Administration
United States Department of Transportation
Box 50206
3000 Ala Moana Boulevard
Honolulu, Hawaii 96850

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui
Hana Highway Historic District

Dear Mr. Wong:

Thank you for your e-mail memo dated April 23, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

1. Project plans call for the construction of a one-lane bridge. As such, building one lane at a time is not a viable option;

2. A design exception request for the one lane bridge will be submitted to the Hawaii Department of Transportation;

3. Current plans for the bridge reconstruction call for the construction of two concrete piers and the removal of the old pier segments;

4. As part of the draft environmental assessment (EA) process, we have initiated early consultations with the State Historic Preservation Division. In addition, we will be contacting the Maui Cultural Resources Commission (CRC) and the Alliance for the Heritage of East Maui (AHEM) to seek further counsultation and comment; and

5. The Draft EA will address potential impacts of the temporary bridge structure.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\awonng.ltr

United States Department of Agriculture

NRCS Natural Resources Conservation Service

P.O. Box 50004
Honolulu, HI 96850
Phone: 808-541-2600
FAX: 808-541-1335

Our People...Our Islands...In Harmony

April 26, 2002

Mr. Clyde Morimoto, Project Manager
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

Subject: Pre-Assessment Consultation – Waiohonu Bridge Replacement, Hana, Maui

We have reviewed the above mentioned document and have no comments to offer at this time.

Thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

Cc:
Mr. Joe Krueger, Project manager, County of Maui, Department of Public Works and Waste Management, 200 South High Street, Wailuku, Hawaii 96793

Subject: Waiohonu Bridge Replacement - Pre-Assessment Consultation letter dated 4/8/02
From: Sean_Hiraoka@exec.state.hi.us
Date: Thu, 18 Apr 2002 13:15:27 -1000
To: maui@satoandassociates.com
CC: Julius_Fronda@exec.state.hi.us, Gary_Choy@exec.state.hi.us, domingo.galicinao@fhwa.dot.gov

Clyde,

The State Highways Design Section offers no comments on the Pre-Assessment Consultation for the DEA at this time; however, we look forward to assisting Maui County DPW in obligating the Federal funding and awarding the Construction contract for the subject project.

Note: Please request a copy of the "County Federal-Aid Project Submittal Procedures" from Maui County DPW to familiarize yourself with HWY-DD's involvement/requirements.

Mahalo,

Sean

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BRUCE S. ANDERSON
MEREDITH J. CHING
CLAYTON W. DELA CRUZ
BRIAN C. NISHIDA
HERBERT M. RICHARDS, JR

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

APR 19 2002

RECEIVED
APR 23 2002
SATO & ASSOCIATES, INC
Maui Office

Mr. Clyde Morimoto
Sato and Associates, Inc.
Consulting Engineers
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

Bridge Replacement and Temporary Detour Bridge
Waiohonu Stream, Hana, Maui

This is in response to your Pre-Assessment letter dated April 8, 2002, requesting a determination if a Stream Channel Alteration Permit (SCAP) application would be required for the proposed bridge replacement on Maui.

The proposed work involves removal of existing bridge piers, modification of bridge abutments, and construction of a temporary detour roadway and bridge. Alterations to the bed and banks of Waiohonu Stream require a Stream Channel Alteration Permit. The Waiohonu Bridge replacement project as proposed will require a Stream Channel Alteration Permit.

Thank you for consulting us in this matter. Should you have any questions, please contact David Higa of the Commission staff at our toll free number 984-2400, ext 70249.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

SKS:sd
c. Mr. Joe Krueger, Project Manager, DPW &WM, County of Maui

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Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Linnel T. Nishioka, Deputy Director
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
PO Box 621
Honolulu, HI 96809

Subject: Waiohonu Bridge Replacement, Hana Maui

Dear Mrs. Nishioka:

Thank you for your comment letter dated April 19, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

The proposed project involves alterations to the bed and banks of the Waiohonu Stream. Accordingly, a Stream Channel Alteration Permit will be processed with your department.

Thank you for your interest in this important project . Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manger

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\cwrm.ltr

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

April 24, 2002

LD-NAV
WAIOHONUBRIDGERPMT.RCM

L-2237/2259/2082/2320

Sato & Associates, Inc.
Clyde Morimoto, Project Manager
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

SUBJECT: Review: Pre-Consultation for Preparation of a Draft Environmental Assessment
Authority: County of Maui Planning Department
Applicant: County of Maui
Project: Waiohonu Bridge Replacement
Location: Kakio & Makaalea, Hana, Maui, Hawaii
TMK: 2nd/ 1-4-011 and 1-4-012

Thank you for the opportunity to review and comment on the Waiohonu Bridge Replacement project.

The DLNR Land Division distributed a copy of your letter (summary) and exhibit titled "Portion of the Final Preservation Plan for the County of Maui Bridges Within the Hana Highway Historic District" to the following Department of Land and Natural Resources' Divisions for their review and comment:

- Division of Aquatic Resources
- Division of Forestry and Wildlife
- Na Ala Hele Trails
- Natural Area Reserve System
- Division of State Parks
- Commission on Water Resource Management
- Division of Boating and Ocean Recreation
- Historic Preservation Division
- Land Division Engineering Branch
- Land Division Planning and Technical Services
- Land Division Maui District Land Office

Attached is a copy of the Commission on Water Resource Management's letter dated April 19, 2002, addressed to your office. The Department of Land and Natural Resources has no other comment to offer on the subject matter, at this time.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at (808) 587-0438.

Very truly yours,

DIERDRE S. MAMIYA
Administrator

C: Maui District Land Office

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

APR 19 2002

Mr. Clyde Morimoto
Sato and Associates, Inc.
Consulting Engineers
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

Bridge Replacement and Temporary Detour Bridge
Waiohonu Stream, Hana, Maui

This is in response to your Pre-Assessment letter dated April 8, 2002, requesting a determination if a Stream Channel Alteration Permit (SCAP) application would be required for the proposed bridge replacement on Maui.

The proposed work involves removal of existing bridge piers, modification of bridge abutments, and construction of a temporary detour roadway and bridge. Alterations to the bed and banks of Waiohonu Stream require a Stream Channel Alteration Permit. The Waiohonu Bridge replacement project as proposed will require a Stream Channel Alteration Permit.

Thank you for consulting us in this matter. Should you have any questions, please contact David Higa of the Commission staff at our toll free number 984-2400, ext 70249.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

SKS:sd
c. Mr. Joe Krueger, Project Manager, DPW &WM, County of Maui

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

April 25, 2002

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

LD-NAV
WAIOHONUBRIDGERPMT.RCM2

L-2322

Sato & Associates, Inc.
Clyde Morimoto, Project Manager
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

SUBJECT: Review: Pre-Consultation for Preparation of a Draft Environmental Assessment
Authority: County of Maui Planning Department
Applicant: County of Maui
Project: Waiohonu Bridge Replacement
Location: Kakio & Makaalea, Hana, Maui, Hawaii
TMK: 2nd/ 1-4-011 and 1-4-012

This is a follow-up to our letter (Ref.: WAIOHONUBRIDGERPMY.RCM) to you dated April 24, 2002, pertaining to the subject matter.

Attached herewith is a recently received copy of the Land Division Maui District Land Office comment.

The Department of Land and Natural Resources has no other comment to offer on the subject matter, at this time.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at (808) 587-0438.

Very truly yours,

Charlene E. Unoki

for DIERDRE S. MAMIYA
Administrator

C: Maui District Land Office

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
54 South High Street, Room 101
Wailuku, Hawaii 96793-2198

April 22, 2002

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

MEMORANDUM

TO: Dierdre S. Mamiya, Administrator
Land Division

FROM: Jason Koga
District Land Agent

SUBJECT: Pre-Consultation for Preparation of a Draft Environmental Assessment, Waiohonu Bridge Replacement, TMK: (2) 1-4-011 and 1-4-012

According to our inventory, the Waiohonu Streambed is owned by the State of Hawaii.

To support the County's construction work, a right of entry can be processed by this office for the temporary bridge and any work area outside of the roadway right-of-way.

The Maui District Land Office has no further comments. Thank you for allowing us to review and comment on the subject matter.

c: Central Files
District Files

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

April 26, 2002

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

LD-NAV
WAIOHONUBRIDGERPMT.RCM3

L-2359

Sato & Associates, Inc.
Clyde Morimoto, Project Manager
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

SUBJECT: Review: Pre-Consultation for Preparation of a Draft Environmental Assessment
Authority: County of Maui Planning Department
Applicant: County of Maui
Project: Waiohonu Bridge Replacement
Location: Kakio & Makaalea, Hana, Maui, Hawaii
TMK: 2nd/ 1-4-011 and 1-4-012

This is a follow-up to our letters (Ref.: WAIOHONUBRIDGERPMY.RCM/RCM2) to you dated April 24 and 25, 2002, pertaining to the subject matter.

Attached herewith is a recently received copy of the Land Division Engineering Branch comment.

The Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at (808) 587-0438.

Very truly yours,

for DIERDRE S. MAMIYA
Administrator

C: Maui District Land Office

DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Engineering Branch

COMMENTS

For the proposed construction of a bridge replacement and temporary detour road, and their related improvements, we offer the following suggestions:

1. The proposed construction work should be done according to all applicable County Flood Ordinances, related to work within a flood zone.

2. If utilities (sewer, gas, water, etc.) are to be suspended along the bridge structure, they should be located and constructed to minimize flood damage, leakage and prevent snagging of debris.

3. A scour analysis should be conducted to ensure that the design of the structure will minimize erosion at the foundation. If the channel opening at the structure is widened, evaluate downstream reaches to provide for adequate capacity and erosion.

4. The proposed bridge should not impede the storm water carrying capacity of the body of water it crosses.

5. When a single span structure replaces a multi-span structure, the pier footings along with the pier columns should be removed (at least to the finished grade) to prevent the trapping of debris.

For your information, the proposed project site, according to FEMA Community-Panel Number 150003 0385 B, is located in Zone A. Zone A is an area within the 100-year flood plain, with base flood elevations and flood hazard factors not determined.

Signed: Andrew M. Monden 4/24/02
ANDREW M. MONDEN, CHIEF ENGINEER

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

May 7, 2002

LD-NAV
WAIOHONUBRIDGERPMT.RCM4

L-2395

Sato & Associates, Inc.
Clyde Morimoto, Project Manager
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

SUBJECT: Review: Pre-Consultation for Preparation of a Draft Environmental Assessment
Authority: County of Maui Planning Department
Applicant: County of Maui
Project: Waiohonu Bridge Replacement
Location: Kakio & Makaalea, Hana, Maui, Hawaii
TMK: 2nd/ 1-4-011 and 1-4-012

This is a follow-up to our letters (WAIOHONUBRIDGERPMY.RCM/RCM2/RCM3) to you dated April 24, 25 and 26 2002, pertaining to the subject matter.

Attached herewith is a recently received copy of the Division of Aquatic Resources' comment.

The Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at (808) 587-0438.

Very truly yours,

for DIERDRE S. MAMIYA
Administrator

c: Maui District Land Office

Ref.: WAIOHONUBRIDGERPMT.COM

State of Hawaii
Department of Land and Natural Resources
DIVISION OF AQUATIC RESOURCES
April 18, 2002

MEMORANDUM

To: Dierdre S. Mamiya, Administrator
Land Division
From: William S. Devick, Administrator
Division of Aquatic Resources
Subject: Comments on __x__ Pre-Consultation for Preparation of a Draft Environmental Assessment

Comments Requested By: Nick Vaccaro

Summary of Project

Title: Waiohonu Bridge Replacement
Proj. By: County of Maui
Location: Kakio & Makaalea, Hana, Maui, Hawaii

Brief Descripion:

The County of Maui is proposing to replace the existing Waiohonu Bridge with a new one-lane bridge. Sato & Associates is the prime consultant for the project and is in the process of preparing a draft Environmental Assessment for the project.

Comments:

The Environmental Assessment should address the impacts the proposed project will have on the water quality and aquatic life in Waiohonu Stream. Proposed mitigative measures should be described in detail.

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Dierdre S. Mamiya, Administrator
State of Hawaii
Department of Land and Natural Resources
Land Division
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Mrs. Mamiya:

Thank you for your comment letters dated April 24, 25, 26, and May 7, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

1. ***Commission on Water Resource Management***

The proposed project involves alterations to the bed and banks of the Waiohonu Stream. Accordingly, a Stream Channel Alteration Permit will be processed with your Department.

2. ***Land Division - Maui Office***

The necessary right of entry for the temporary bridge, and all other work to take place outside of the County of Maui right-of-way, will be processed at the Maui office of the DLNR- Land Division .

3. ***Engineering Branch***

A. All proposed improvements will be constructed in accordance with the Maui County Codes Chapter 19.62, Flood Hazard Areas;

B. Should utility lines require suspension to the reconstructed bridge structure, they will be attached so as to minimize flood damage, leakage and to prevent snagging of debris;

C. A drainage report has been completed for the project by Sato & Associates, Inc., which includes a scour analysis. See Exhibit "A". Further, project plans do not call for the widening of the channel opening;

D. According to the project's report, the proposed bridge improvements will not impede the storm water carrying capacity of the Waiohonu Stream. Refer to Exhibit "A".

E. Project plans call for the removal of the pier footings and columns which will no longer be utilized.

4. ***Department of Aquatic Resources***

The draft environmental assessment (EA) will address potential impacts and mitigating measures relating to water quality and aquatic life in the Waiohonu Stream.

Thank you for your interest in this important matter. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

Enclosure

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\dlnr.ltr

A Copy Of The Drainage Report Was Attached To The Department of Land and Natural Resources Response Letter As Exhibit "A" And Has Been Incorporated In This Draft EA As Appendix F

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

GILBERT S. COLOMA-AQARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTIES
ERIC T HIRANO
LINNEL NISHIOKA

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

April 17, 2002

Sato & Associates, Inc.
2115 Wells Street
Wailuku, HI 96793

LOG NO: 29665
DOC NO: 0204tm13

Attention: Mr. Clyde Morimoto

Dear Mr. Morimoto:

SUBJECT: Waiohonu Bridge Replacement Project
Hana Highway Historic District
TMK: 1-4-12, Hana, Maui

Thank you for transmitting the proposal to replace the Waiohonu Bridge within the Hana Highway Historic District. While we would prefer to see the original bridge maintained and repaired rather than replaced, we understand that Maui County and the consultants have researched alternative methods and determined replacement is the only feasible solution at this time. Please be advised that if this is utilizing federal funds, we still need to go through the Section 106 Review process, which will include community input. Under current rules for the National Historic Preservation Act, any demolition is considered an adverse affect which would then involve a Memorandum of Agreement to mitigate these adverse affects.

Thank you for the opportunity to comment. Should you have further questions, please feel free to call Tonia Moy at (808)692-8030.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

TM:jk

RECEIVED
APR 26 2002
SATO & ASSOCIATES, INC
Maui Office

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

S

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTIES
ERIC T. HIRANO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

May 14, 2002

LOG NO: 29843 ✓
DOC NO: 0205CD07

Mr. Clyde Morimoto
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

SUBJECT: **National Historic Preservation Act Section 106 Review Pertaining to an Information Request for the Proposed Waiohonu Bridge Replacement Project**
Maka`alae and Waiohonu Ahupua`a, Hana District, Island of Maui
TMK: (2) 1-4-011 and 1-4-012

Thank you for the opportunity to respond to your information request pertaining to the proposed Waiohonu Bridge Replacement Project, which was received by this office April 10, 2002. Our review is based on reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was conducted of the subject property.

Based on the submitted information request, we understand the proposed undertaking consists of the construction of a new bridge located at the bridge location at approximately the same elevation, removal of some of the existing piers, and utilizing a temporary single lane detour roadway and bridge on the mauka or makai side of the existing bridge.

A search of our records indicates an archaeological inventory survey has not been conducted of the subject property. This area in general is likely to have once been the location of pre-Contact farming, perhaps with scattered houses. Further attesting to the importance of this area during the pre-Contact and early historic periods are State Site 50-50-13-1082, the Waiohonu Pictographs, located just mauka of the proposed undertaking in Waiohonu Gulch, and Site 50-50-13-4006, a habitation complex located on the makai side of the proposed undertaking. As this area has not undergone an archaeological inventory survey neither of these historic sites have been recorded and documented in any detail so we do not know the complete extent of either site. Therefore, we believe it is likely that significant historic sites may be present in the proposed project area.

Therefore, in order to determine the effect of the proposed undertaking on historic sites, we recommend that no action be taken on the proposed undertaking until an archaeological inventory survey has been conducted of the proposed project area to determine whether significant historic sites are present. An acceptable report documenting the findings of the survey will need to be submitted to this office for review. If significant historic sites are identified, a mitigation plan may need to be developed, in consultation with this office, and executed.

If you have any questions, please call Cathleen Dagher at 692-8023.

Aloha,

Gilbert Coloma-Agaran
State Historic Preservation Officer

c. Joe Kruger, County of Maui

CD:amk

RECEIVED
MAY 24 2002
SATO & ASSOCIATES, INC
Maui Office

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
ERIC T. HIRANO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

June 14, 2002

Mr. Clyde Morimoto
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

LOG NO: 30100
DOC NO: 0206CD29

Dear Mr. Morimoto:

SUBJECT: Revised National Historic Preservation Act Section 106 Review
Pertaining to an Information Request for the Proposed Waiohonu Bridge Replacement Project
Maka`alae and Waiohonu Ahupua`a, Hana District, Island of Maui
TMK: (2) 1-4-011 and 1-4-012

These are our revised comments pertaining to the proposed Waiohonu Bridge Replacement Project. Our previous comments (SHPD DOC NO.: 0205CD07/LOG NO.: 29843) recommended that no action be taken on the proposed undertaking until an archaeological inventory survey has been conducted of the proposed project area.

Our records indicate that a field inspection was conducted of the subject parcel on Tuesday July 3, 2001, by Patty Jo Conte, previously of our Hawaiian Homelands Division. Based on the results of the field inspection and a recent telephone conversation, between Ms. Conte and Cathleen Dagher, SHPD Assistant Maui/Lana`i Island Archaeologist, we understand the sites mentioned in our previous correspondence (State Site 50-50-13-1082, the Waiohonu Pictographs, located mauka of the proposed undertaking in Waiohonu Gulch, and Site 50-50-13-4006, a habitation complex located on the makai side of the proposed undertaking) are not in close proximity to the proposed project area.

Given the above information, we wish to revise our comments. We now believe that there will be "no archaeological properties affected" by the proposed undertaking. However, please see attached correspondence regarding the bridge replacement.

If you have any questions, please call Cathleen Dagher at 692-8023.

Aloha,

Gilbert Coloma-Agaran
State Historic Preservation Officer

CD:jen

c: Joe Kruger, County of Maui

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Gilbert Coloma-Agaran, Administrator
State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui
Hana Highway Historic District

Dear Mr. Coloma-Agaran:

Thank you for your comment letters dated April 17, 2002, May 14, 2002 and June 14, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

As the proposed project will be utilizing federal funds, the requirements of Section 106 will be addressed. Further, a Memorandum of Agreement (MOA) will be prepared pursuant to the National Historic Preservation Act.

We look forward to working with your office to address the Section 106 and MOA requirements. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\shpd.ltr

Subject: Waiohonu Bridge Replacement
From: Paul_Santo@exec.state.hi.us
Date: Wed, 1 May 2002 13:33:55 -1000
To: "Clyde Morimoto" <maui@satoandassociates.com>

Clyde,

Thank you for your letter dated April 8, 2002 requesting for comments for the subject project Draft EA preconsultation. I have no comments regarding details of the project at this time.

If there are any questions regarding bridge matters, please feel free to contact me.

Paul Santo
Bridge Design Engineer
Hawaii DOT, Highways Division
Bridge Design Section
601 Kamokila Blvd., Room 611
Kapolei, HI 96707
Phone: 692-7611
Fax: 692-7617
e-mail: paul_santo@exec.state.hi.us

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:
02-091/epo

May 3, 2002

Mr. Clyde Morimoto, Project Manager
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto

Subject: Pre-Environmental Assessment Consultation (PEA)
Waiohonu Bridge Replacement, Hana, Maui

Thank you for the opportunity to review and comment on the subject proposal. The CDUA was routed to the various branches of the Environmental Health Administration. We have the following comments.

Clean Water Branch (CWB)

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. A Section 401 Water Quality Certification is required for "Any applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...", pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act");

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following discharges to waters of the State:

   a. Discharge of storm water runoff associated with industrial activities, as define in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi);

   b. Discharge of storm water runoff associated with construction activities that involve the disturbance of five (5) acres or greater, including clearing, grading, and excavation;

c. Discharge of treated effluent from leaking underground storage tank remedial activities;

d. Discharge of once through cooling water less than one million gallons per day;

e. Discharge of hydro-testing water;

f. Discharge of construction dewatering effluent;

g. Discharge of treated effluent from petroleum bulk stations and terminals; and

h. Discharge of treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department of Health, Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges to State waters;

3. If construction activities involve the disturbance of one acre or greater, including clearing, grading, and excavation, and will take place or extend after March 10, 2003, an NPDES general permit coverage is required for discharges of storm water runoff into State waters; and

4. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters.

If you have any questions, please contact the Clean Water Branch at (808) 586-4309.

Clean Air Branch (CAB)

There is a significant potential for fugitive dust emissions during the construction activities. Implementation of adequate dust control measures during all phases of construction is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at 586-4200.

Noise, Radiation and Indoor Air Quality (NRIAQ) Branch

All project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46, on "Community Noise Control".

If you have any questions, please contact the NRIAQ at (808) 586-4701.

Environmental Planning Office (EPO)

The Draft Environmental Assessment (DEA) should summarize the findings of the stream survey conducted for this project and discuss how adverse effects to stream habitat and biota would be avoided or mitigated during project constructions and after project completion. Please provide a copy of the stream survey for our stream bio-assessment program files.

If you have any questions, please contact the Environmental Planning Office at (808) 586-4337.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: CWB
CAB
NRIAQ
EPO

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Gary Gill, Deputy Director
Environmental Health Administration
State of Hawaii
Department of Health
PO BOX 3378
Honolulu, HI 96801

Subject: Waiohonu Bridge Replacement, Hana Maui

Dear Mr. Gill:

Thank you for your comment letter dated May 3, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

1. We have consulted with Mr. George Young, P.E. of the Department of the Army (DA) who has informed us that a DA permit will be required for the proposed project. In addition, a Section 401 Water Quality Certification will be processed with your office.

2. We do not believe a National Pollutant Discharge Elimination System (NPDES) general permit will be required for the proposed project. However, should it be determined that one is required, we will file the necessary Notice of Intent with the Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges into State waters.

3. Proposed construction activities, including ground disturbances, are anticipated to include an area significantly less than one acre.

4. Proposed construction activities are not anticipated to include discharge of wastewater into State waters.

5. In an effort to mitigate the potential for fugitive dust emissions, adequate dust control measures will be implemented in compliance with Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," and Chapter 11-60.1-33, "Fugitive Dust".

6. In an effort to reduce potential impacts to ambient noise levels, construction activities will comply with the Administrative Rules of the Department of Health, Chapter 11-46 on "Community Noise Control".

7. The Draft Environmental Assessment (EA) will summarize the findings of the stream survey, including reference to necessary mitigative measures to avoid adverse impacts on stream habitat and biota. In addition, we will provide the office of Environmental Planning with a copy of the stream survey.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waichonu\dohltr.001

BENJAMIN J. CAYETANO
GOVERNOR

ANTHONY J.H. CHING
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

May 6, 2002

FAXED

Mr. Clyde Morimoto
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

Subject: Pre-Assessment Consultation for Waiohonu Bridge Replacement, Hana, Maui

We are in receipt of your letter dated April 8, 2002, requesting comments in the pre-assessment consultation phase for the subject project's Draft Environmental Assessment (DEA). We note that the existing Waiohonu Bridge, the detour bridges (both mauka and makai alternatives), and portions of the detour roadway, as represented on the tax maps and plot plans, are designated within the State Land Use Agricultural District. Certain segments of the detour roadway appear to be located within the State Land Use Rural District.

We suggest that the DEA include a map showing the project site in relation to the State land use districts. We have no further comments to offer at this time. Thank you for the opportunity to comment on the subject project.

Please feel free to contact Bert Saruwatari of my office at 587-3822, should you require clarification or any further assistance.

Sincerely,

Anthony J.H. Ching

ANTHONY J. H. CHING
Executive Officer

c: OEQC
County of Maui Department of Public Works
and Waste Management

RECEIVED
MAY 08 2002
SATO & ASSOC., INC.
MAUI OFFICE

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Anthony J. H. Ching, Executive Officer
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui
Hana Highway Historic District

Dear Mr. Ching:

Thank you for your comment letter dated May 6, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

The draft Environmental Assessment (EA) will include a map showing the project site in relation to the State Land Use Districts.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

satolwaiohonultaching.ltr

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENT QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

May 7, 2002

Mr. Clyde Morimoto
Sato and Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

Subject: Waiohonu Bridge Replacement - Pre-assessment Consultation

Thank you for the opportunity to review the subject project. We have the following comments.

1. Please study the impact of the project on Waiohonu Stream's biota, water quality and drainage capacity.

2. Please study the cumulative impact (historic character, tourism and urban development, traffic) of replacing all the deficient Hana Highway bridges.

3. Please study the impact of the temporary detour roadway and bridge.

4. Please avoid or minimize work in the stream bed and banks.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson
Director

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Genevieve Salmonson, Director
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96793

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui
Hana Highway Historic District

Dear Mrs. Salmonson:

Thank you for your comment letter dated May 7, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

1. The project potential impacts on the biota, water quality and drainage capacity of the Waiohonu Stream will be addressed.

2. The Draft EA will address the relationship of the proposed project to the overall need to repair or replace other deficient bridges.

3. Potential impacts of the temporary detour roadway and bridge will be addressed.

4. New piers required for the replacement bridge will involve work in the stream bed, however, to the extent practicable, the extent of work in the stream bed will be minimized.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\oeqc.ltr

JAMES "KIMO" APANA
MAYOR

CLAYTON T. ISHIKAWA
CHIEF

RICHARD A. FERNANDEZ
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 270-7561
FAX (808) 270-7919

April 10 2002

Clyde Morimoto
Sato & Associates, Inc.
2115 Walls Street
Wailuku, HI 96793

Subject: Waiohonu Bridge Replacement
Hana, Hawaii

Dear, Mr. Morimoto;

Thank you for the opportunity to comment on the above subject. At this the Fire Prevention Bureau would request that the temporary and new bridge meet the requirements for fire truck access. Fire truck turning radius 34 feet outside turning radius, Fire truck weight 38,000 pounds. These spec. are for the Hana fire truck.

If you have any question, you may call at 270-7122.

Sincerely,

Scott English
Fire Plan Examiner

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Scott English, Fire Plan Examiner
County of Maui
Department of Fire Control
200 Diary Road
Kahului, Hawaii 96732

SUBJECT: *Waiohonu* Bridge Replacement, Hana, Maui

Dear Mr. English:

Thank you for your comment letter of April 12, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

The proposed temporary bridge structure will have a load capacity of twenty tons, and will be capable of accommodating the outside turn radius of the Hana fire truck (34 feet). The new bridge structure will also meet the necessary requirements for fire truck access.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\mfd.ltr

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 270-7816 • Fax (808) 270-7199

April 16, 2002

Mr. Clyde Morimoto
Sato & Associates, Inc.
2115 Wells Street
Wailuku, HI 96793

Re: Waiohonu Bridge Replacement

Dear Mr. Morimoto,

The Department of Water Supply 4-inch water line is suspended from the subject bridge. This line and appurtenances will need to be relocated outside the construction area. An upgrade of the 4-inch line in this area to 8-inch is proposed in the Department long term Capital Improvement Program. We suggest that this upgrade be accommodated in the right-of-way of the bridge replacement project. The applicants should contact our Engineering Division at 270-7835 as soon as possible to discuss these issues, including alternative water service arrangements for the service area during construction.

The project overlies the Waihoi aquifer and crosses the Waiohonu Stream. The Department of Water Supply strives to protect the integrity of both surface water and groundwater resources by encouraging the use of best management practices (BMPs) relevant to potentially polluting project activities. We encourage the applicant to build BMPs into the design and implementation of the bridge replacement project. We have attached sample BMP for road and bridge construction and a reference list of BMP resources. Additional information can be obtained from the State Department of Health.

Should you have any questions, please call our Water Resources and Planning Division at 270-7199.

Sincerely,

David Craddick
Director
emb

cc: engineering
applicant w/attachments:

Selected BMPs from "Guidance Specifying Management Measures For Sources of Nonpoint Pollution In Coastal Waters." U.S.EPA.
References for Further Reading from "The Megamanual - Nonpoint Source Management Manual." Commonwealth of Massachusetts

C:\WPdocs\EAs EISs\Waiohonu Bridge Replace pre-EA.WPD

By Water All Things Find Life

United States
Environmental Protection
Agency

Office of Water
Washington, DC 20460

840-B-92-002
January 1993

EPA

Guidance Specifying Management Measures For Sources Of Nonpoint Pollution In Coastal Waters

Issued Under the Authority of
Section 6217(g) of the Coastal Zone Act
Reauthorization Amendments of 1990

VII. ROADS, HIGHWAYS, AND BRIDGES

NOTE: Management Measures II.A and II.B of this chapter also apply to planning, siting, and developing roads and highways.[6]

A. Management Measure for Planning, Siting, and Developing Roads and Highways

Plan, site, and develop roads and highways to:

(1) Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;

(2) Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and

(3) Limit disturbance of natural drainage features and vegetation.

1. Applicability

This measure is intended to be applied by States to site development and land disturbing activities for new, relocated, and reconstructed (widened) roads (including residential streets) and highways in order to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants from such activities. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

The best time to address control of NPS pollution from roads and highways is during the initial planning and design phase. New roads and highways should be located with consideration of natural drainage patterns and planned to avoid encroachment on surface waters and wet areas. Where this is not possible, appropriate controls will be needed to minimize the impacts of NPS runoff on surface waters.

This management measure emphasizes the importance of planning to identify potential NPS problems early in the design process. This process involves a detailed analysis of environmental features most associated with NPS pollution, erosion and sediment problems such as topography, drainage patterns, soils, climate, existing land use, estimated traffic volume, and sensitive land areas. Highway locations selected, planned, and designed with consideration of these features will greatly minimize erosion and sedimentation and prevent NPS pollutants from entering watercourses during and after construction. An important consideration in planning is the distance between

[6] Management measure II.A applies only to runoff that emanates from the road, highway, and bridge right-of-way. This management measure does not apply to runoff and total suspended solid loadings from upland areas outside the road, highway, or bridge project.

a highway and a watercourse that is needed to buffer the runoff flow and prevent potential contaminants from entering surface waters. Other design elements such as project alignment, gradient, cross section, and the number of stream crossings also must be taken into account to achieve successful control of erosion and nonpoint sources of pollution. (Refer to Chapter 3 of this guidance for details on road designs for different terrains.)

The following case study illustrates some of the problems and associated costs that may occur due to poor road construction and design. These issues should be addressed in the planning and design phase.

CASE STUDY - ANNAPOLIS, MARYLAND

Poor road siting and design resulted in concentrated runoff flows and heavy erosion that threatened several house foundations adjacent to the road. Sediment-laden runoff was also discharged into Herring Bay. To protect the Chesapeake Bay and the nearby houses, the county corrected the problem by installing diversions, a curb-and-drain urban runoff conveyance, and a rock wall filtration system, at a total cost of $100,000 (Munsey, 1992).

3. Management Measure Selection

This management measure was selected because it follows the approach to highway development recommended by the American Association of State Highway and Transportation Officials (AASHTO), Federal Highway Administration (FHWA) guidance, and highway location and design guidelines used by the States of Virginia, Maryland, Washington, and others.

Additionally, AASHTO has location and design guidelines (AASHTO, 1990, 1991) available for State highway agency use that describe the considerations necessary to control erosion and highway-related pollutants. Federal Highway Administration policy (FHWA, 1991) requires that Federal-aid highway projects and highways constructed under direct supervision of the FHWA be located, designed, constructed, and operated according to standards that will minimize erosion and sediment damage to the highway and adjacent properties and abate pollution of surface water and ground-water resources.

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

a. *Consider type and location of permanent erosion and sediment controls (e.g., vegetated filter strips, grassed swales, pond systems, infiltration systems, constructed urban runoff wetlands, and energy dissipators and velocity controls) during the planning phase of roads, highway, and bridges. (AASHTO, 1991; Hartigan et al., 1989)*

b. *All wetlands that are within the highway corridor and that cannot be avoided should be mitigated. These actions will be subject to Federal Clean Water Act section 404 requirements and State regulations.*

c. *Assess and establish adequate setback distances near wetlands, waterbodies, and riparian areas to ensure protection from encroachment in the vicinity of these areas.*

Setback distances should be determined on a site-specific basis since several variables may be involved such as topography, soils, floodplains, cut-and-fill slopes, and design geometry. In level or gently sloping terrain, a general rule of thumb is to establish a setback of 50 to 100 feet from the edge of the wetland or riparian area and the right-of-way. In areas of steeply sloping terrain (20 percent or greater), setbacks of 100 feet or more are recommended. Right-of-way setbacks from major waterbodies (oceans, lakes, estuaries, rivers) should be in excess of 100 to 1000 feet.

d. *Avoid locations requiring excessive cut and fill. (AASHTO, 1991)*

e. *Avoid locations subject to subsidence, sink holes, landslides, rock outcroppings, and highly erodible soils. (AASHTO, 1991; TRB, Campbell, 1988)*

f. *Size rights-of-way to include space for siting runoff pollution control structures as appropriate. (AASHTO, 1991; Hartigan, et al., 1989)*

Erosion and sediment control structures (extended detention dry ponds, permanent sediment traps, catchment basins, etc.) should be planned and located during the design phase and included as part of the design specifications to ensure that such structures, where needed, are provided within the highway right-of-way.

g. *Plan residential roads and streets in accordance with local subdivision regulations, zoning ordinances, and other local site planning requirements (International City Managers Association, Model Zoning/Subdivision Codes). Residential road and street pavements should be designed with minimum widths.*

Local roads and streets should have right-of-way widths of 36 to 50 feet, with lane widths of 10 to 12 feet. Minimum pavement widths for residential streets where street parking is permitted range from 24 to 28 feet between curbs. In large-lot subdivisions (1 acre or more), grassed drainage swales can be used in lieu of curbs and gutters and the width of paved road surface can be between 18 and 20 feet.

h. *Select the most economic and environmentally sound route location. (FHWA, 1991)*

i. *Use appropriate computer models and methods to determine urban runoff impacts with all proposed route corridors. (Driscoll, 1990)*

Computer models to determine urban runoff from streets and highways include TR-55 (Soil Conservation Service model for controlling peak runoff); the P-8 model to determine storage capacity (Palmstrom and Walker); the FHWA highway runoff model (Driscoll et al., 1990); and others (e.g., SWMM, EPA's stormwater management model; HSP continuous simulation model by Hydrocomp, Inc.).

j. *Comply with National Environmental Policy Act requirements including other State and local requirements. (FHWA, T6640.8A)*

k. *Coordinate the design of pollution controls with appropriate State and Federal environmental agencies. (Maryland DOE, 1983)*

l. Develop local official mapping to show location of proposed highway corridors.

Official mapping can be used to reserve land areas needed for public facilities such as roads, highways, bridges, and urban runoff treatment devices. Areas that require protection, such as those which are sensitive to disturbance or development-related nonpoint source pollution, can be reserved by planning and mapping necessary infrastructure for location in suitable areas.

5. Effectiveness Information and Cost Information

The most economical time to consider the type and location of erosion, sediment, and NPS pollution control is early in the planning and design phase of roads and highways. It is much more costly to correct polluted runoff problems after a road or highway has already been built. The most effective and often the most economical control is to design roads and highways as close to existing grade as possible to minimize the area that must be cut or filled and to avoid locations that encroach upon adjacent watercourses and wet areas. However, some portions of roads and highways cannot always be located where NPS pollution does not pose a threat to surface waters. In these cases, the impact from potential pollutant loadings should be mitigated. Interactive computer models designed to run on a PC are available (e.g., FHWA's model, Driscoll et al., 1990) and can be used to examine and project the runoff impacts of a proposed road or highway design on surface waters. Where controls are determined to be needed, several cost-effective management practices, such as vegetated filter strips, grassed swales, and pond systems, can be considered and used to treat the polluted runoff. These mitigating practices are described in detail in the discussion on urban developments (Management Measure IV.A).

B. Management Measure for Bridges

Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

1. Applicability

This management measure is intended to be applied by States to new, relocated, and rehabilitated bridge structures in order to control erosion, streambed scouring, and surface runoff from such activities. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

This measure requires that NPS runoff impacts on surface waters from bridge decks be assessed and that appropriate management and treatment be employed to protect critical habitats, wetlands, fisheries, shellfish beds, and domestic water supplies. The siting of bridges should be a coordinated effort among the States, the FHWA, the U.S. Coast Guard, and the Army Corps of Engineers. Locating bridges in coastal areas can cause significant erosion and sedimentation, resulting in the loss of wetlands and riparian areas. Additionally, since bridge pavements are extensions of the connecting highway, runoff waters from bridge decks also deliver loadings of heavy metals, hydrocarbons, toxic substances, and deicing chemicals to surface waters as a result of discharge through scupper drains with no overland buffering. Bridge maintenance can also contribute heavy loads of lead, rust particles, paint, abrasive, solvents, and cleaners into surface waters. Protection against possible pollutant overloads can be afforded by minimizing the use of scuppers on bridges traversing very sensitive waters and conveying deck drainage to land for treatment. Whenever practical, bridge structures should be located to avoid crossing over sensitive fisheries and shellfish-harvesting areas to prevent washing polluted runoff through scuppers into the waters below. Also, bridge design should account for potential scour and erosion, which may affect shellfish beds and bottom sediments.

3. Management Measure Selection

This management measure was selected because of its documented effectiveness and to protect against potential pollution impacts from siting bridges over sensitive waters and tributaries in the coastal zone. There are several examples of siting bridges to protect sensitive areas. The Isle of Palms Bridge near Charleston, South Carolina, was designed without scupper drains to protect a local fishery from polluted runoff by preventing direct discharge into the waters below. In another example, the Louisiana Department of Transportation and Development specified stringent requirements before allowing the construction of a bridge to protect destruction of fragile wetlands near New Orleans. A similar requirement was specified for bridge construction in the Tampa Bay area in Florida (ENR, 1991).

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Additional erosion and sediment control management practices are listed in the construction section for urban sources of pollution (Management Measure IV.A).

a. *Coordinate design with FHWA, USCG, COE, and other State and Federal agencies as appropriate.*

b. *Review National Environmental Policy Act requirements to ensure that environmental concerns are met (FHWA, T6640.8A and 23 CFR 771).*

c. *Avoid highway locations requiring numerous river crossings. (AASHTO, 1991)*

d. *Direct pollutant loadings away from bridge decks by diverting runoff waters to land for treatment.*

Bridge decks should be designed to keep runoff velocities low and control pollutant loadings. Runoff waters should be conveyed away from contact with the watercourse and directed to a stable storm drainage, wetland, or detention pond. Conveyance systems should be designed to withstand the velocities of projected peak discharge.

e. *Restrict the use of scupper drains on bridges less than 400 feet in length and on bridges crossing very sensitive ecosystems.*

Scupper drains allow direct discharge of runoff into surface waters below the bridge deck. Such discharges can be of concern where the waterbody is highly susceptible to degradation or is an outstanding resource such as a spawning area or shellfish bed. Other sensitive waters include water supply sources, recreational waters, and irrigation systems. Care should be taken to protect these areas from contaminated runoff.

f. *Site and design new bridges to avoid sensitive ecosystems.*

Pristine waters and sensitive ecosystems should be protected from degradation as much as possible. Bridge structures should be located in alternative areas where only minimal environmental damage would result.

g. *On bridges with scupper drains, provide equivalent urban runoff treatment in terms of pollutant load reduction elsewhere on the project to compensate for the loading discharged off the bridge.*

5. Effectiveness Information and Cost Information

Effectively controlling NPS pollutants such as road contaminants, fugitive dirt, and debris and preventing accidental spills from entering surface waters via bridge decks are necessary to protect wetlands and other sensitive ecosystems. Therefore, management practices such as minimizing the use of scupper drains and diverting runoff waters to land for treatment in detention ponds and infiltration systems are known to be effective in mitigating pollutant loadings. Tables 4-7 and 4-8 in Section II provide cost and effectiveness data for ponds, constructed wetlands, and filtration devices.

C. Management Measure for Construction Projects

(1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction and

(2) Prior to land disturbance, prepare and implement an approved erosion control plan or similar administrative document that contains erosion and sediment control provisions.

1. Applicability

This management measure is intended to be applied by States to new, replaced, restored, and rehabilitated road, highway, and bridge construction projects in order to control erosion and offsite movement of sediment from such project sites. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

Erosion and sedimentation from construction of roads, highways, and bridges, and from unstabilized cut-and-fill areas, can significantly impact surface waters and wetlands with silt and other pollutants including heavy metals, hydrocarbons, and toxic substances. Erosion and sediment control plans are effective in describing procedures for mitigating erosion problems at construction sites before any land-disturbing activity begins. Additional relevant practices are described in Management Measures III.A and III.B of this chapter.

Bridge construction projects include grade separations (bridges over roads) and waterbody crossings. Erosion problems at grade separations result from water running off the bridge deck and runoff waters flowing onto the bridge deck during construction. Controlling this runoff can prevent erosion of slope fills and the undermining failure of the concrete slab at the bridge approach. Bridge construction over waterbodies requires careful planning to limit the disturbance of streambanks. Soil materials excavated for footings in or near the water should be removed and relocated to prevent the material from being washed back into the waterbody. Protective berms, diversion ditches, and silt fences parallel to the waterway can be effective in preventing sediment from reaching the waterbody.

Wetland areas will need special consideration if affected by highway construction, particularly in areas where construction involves adding fill, dredging, or installing pilings. Highway development is most disruptive in wetlands since it may cause increased sediment loss, alteration of surface drainage patterns, changes in the subsurface water table, and loss of wetland habitat. Highway structures should not restrict tidal flows into salt marshes and other coastal wetland areas because this might allow the intrusion of freshwater plants and reduce the growth of salt-tolerant species. To safeguard these fragile areas, the best practice is to locate roads and highways with sufficient setback distances between the highway right-of-way and any wetlands or riparian areas. Bridge construction also can impact water circulation and quality in wetland areas, making special techniques necessary to accommodate construction. The following case study provides an example of a construction project where special considerations were given to wetlands.

CASE STUDY - BRIDGING WETLANDS IN LOUISIANA

To provide protection for an environmentally critical wetland outside New Orleans, the Louisiana Department of Transportation and Development (DOTD) required a special construction technique to build almost 2 miles of twin elevated structures for the Interstate 310 link between I-10 and U.S. Route 90. A technique known as "end-on" construction was devised to work from the decks of the structures, building each section of the bridge from the top of the last completed section and using heavy cranes to push each section forward one bay at a time. The cranes were also used to position steel platforms, drive in support pilings, and lay deck slabs, alternating this procedure between each bay. Without this technique, the Louisiana DOTD would not have been permitted to build this structure. The twin 9,200-foot bridges took 485 days to complete at a cost of $25.3 million (*Engineering News Record*, 1991).

3. Management Measure Selection

This management measure was selected because it supports FHWA's erosion and sediment control policy for all highway and bridge construction projects and is the administrative policy of several State highway departments and local governmental agencies involved in land development activity. Examples of erosion and sediment controls and NPS pollutant control practices are described in AASHTO guidelines and in several State erosion control manuals (AASHTO, 1991; North Carolina DOT, 1991; Washington State DOT, 1988). A detailed discussion of cost-effective management practices is available in the urban development section (*Section II*) of this chapter. These example practices are also effective for highway construction projects.

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Additional erosion and sediment control management practices are listed in the construction section (Section III) of this chapter.

a. *Write erosion and sediment control requirements into plans, specifications, and estimates for Federal aid construction projects for highways and bridges (FHWA, 1991) and develop erosion control plans for earth-disturbing activities.*

Erosion and sediment control decisions made during the planning and location phase should be written into the contract, plans, specifications, and special provisions provided to the construction contractor. This approach can establish contractor responsibility to carry out the explicit contract plan recommendations for the project and the erosion control practices needed.

b. *Coordinate erosion and sediment controls with FHWA, AASHTO, and State guidelines.*

Coordination and scheduling of the project work with State and local authorities are major considerations in controlling anticipated erosion and sediment problems. In addition, the contractor should submit a general work schedule and plan that indicates planned implementation of temporary and permanent erosion control practices, including shutdown procedures for winter and other work interruptions. The plan also should include proposed methods of control on restoring borrow pits and the disposal of waste and hazardous materials.

c. Install permanent erosion and sediment control structures at the earliest practicable time in the construction phase.

Permanent or temporary soil stabilization practices should be applied to cleared areas within 15 days after final grade is reached on any portion of the site. Soil stabilization should also be applied within 15 days to denuded areas that may not be at final grade but will remain exposed to rain for 30 days or more. Soil stabilization practices protect soil from the erosive forces of raindrop impact and flowing water. Temporary erosion control practices usually include seeding, mulching, establishing general vegetation, and early application of a gravel base on areas to be paved. Permanent soil stabilization practices include vegetation, filter strips, and structural devices.

Sediment basins and traps, perimeter dikes, sediment barriers, and other practices intended to trap sediment on site should be constructed as a first step in grading and should be functional before upslope land disturbance takes place. Structural practices such as earthen dams, dikes, and diversions should be seeded and mulched within 15 days of installation.

d. Coordinate temporary erosion and sediment control structures with permanent practices.

All temporary erosion and sediment controls should be removed and disposed of within 30 days after final site stabilization is achieved or after the temporary practices are no longer needed. Trapped sediment and other disturbed soil areas resulting from the disposition of temporary controls should be permanently stabilized to prevent further erosion and sedimentation (AASHTO, 1991).

e. Wash all vehicles prior to leaving the construction site to remove mud and other deposits. Vehicles entering or leaving the site with trash or other loose materials should be covered to prevent transport of dust, dirt, and debris. Install and maintain mud and silt traps.

f. Mitigate wetland areas destroyed during construction.

Marshes and some types of wetlands can often be developed in areas where fill material was extracted or in ponds designed for sediment control during construction. Vegetated strips of native marsh grasses established along highway embankments near wetlands or riparian areas can be effective to protect these areas from erosion and sedimentation (FHWA, 1991).

g. Minimize the area that is cleared for construction.

h. Construct cut-and-fill slopes in a manner that will minimize erosion.

Cut-and-fill slopes should be constructed in a manner that will minimize erosion by taking into consideration the length and steepness of slopes, soil types, upslope drainage areas, and ground-water conditions. Suggested recommendations are as follows: reduce the length of long steep slopes by adding diversions or terraces; prevent concentrated runoff from flowing down cut-and-fill slopes by containing these flows within flumes or slope drain structures; and create roughened soil surfaces on cut-and-fill slopes to slow runoff flows. Wherever a slope face crosses a water seepage plane, thereby endangering the stability of the slope, adequate subsurface drainage should be provided.

i. Minimize runoff entering and leaving the site through perimeter and onsite sediment controls.

j. Inspect and maintain erosion and sediment control practices (both on-site and perimeter) until disturbed areas are permanently stabilized.

k. *Divert and convey offsite runoff around disturbed soils and steep slopes to stable areas in order to prevent transport of pollutants off site.*

l. *After construction, remove temporary control structures and restore the affected area. Dispose of sediments in accordance with State and Federal regulations.*

m. *All storm drain inlets that are made operable during construction should be protected so that sediment-laden water will not enter the conveyance system without first being filtered or otherwise treated to remove sediment.*

5. Effectiveness Information and Cost Information

The detailed cost and effectiveness information presented under the construction measure for urban development is also applicable to road, highway, and bridge construction. See Tables 4-15 and 4-16 in Section III.

D. Management Measure for Construction Site Chemical Control

(1) Limit the application, generation, and migration of toxic substances;

(2) Ensure the proper storage and disposal of toxic materials; and

(3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface water.

1. *Applicability*

This management measure is intended to be applied by States to new, resurfaced, restored, and rehabilitated road, highway, and bridge construction projects in order to reduce toxic and nutrient loadings from such project sites. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

The objective of this measure is to guard against toxic spills and hazardous loadings at construction sites from equipment and fuel storage sites. Toxic substances tend to bind to fine soil particles; however, by controlling sediment mobilization, it is possible to limit the loadings of these pollutants. Also, some substances such as fuels and solvents are hazardous and excess applications or spills during construction can pose significant environmental impacts. Proper management and control of toxic substances and hazardous materials should be the adopted procedure for all construction projects and should be established by erosion and sediment control plans. Additional relevant practices are described in Management Measure III.B of this chapter.

3. Management Measure Selection

This management measure was selected because of existing practices that have been shown to be effective in mitigating construction-generated NPS pollution at highway project sites and equipment storage yards. In addition, maintenance areas containing road salt storage, fertilizers and pesticides, snowplows and trucks, and tractor mowers have the potential to contribute NPS pollutants to adjacent watercourses if not properly managed (AASHTO, 1988, 1991a). This measure is intended to safeguard surface waters and ground water from toxic and hazardous pollutants generated at construction sites. Examples of effective implementation of this measure are presented in the section on construction in urban areas. Several State environmental agencies are using this approach to regulate toxic and hazardous pollutants (Florida DER, 1988; Puget Sound Basin, .1991).

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

The practices that are applicable to this management measure are described in Section III.B.

5. Effectiveness Information and Cost Information

The detailed cost and effectiveness data presented in the Section III.A of this chapter describing NPS controls for construction projects in urban development areas are also applicable to highway construction projects.

E. Management Measure for Operation and Maintenance

Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

1. Applicability

This management measure is intended to be applied by States to existing, restored, and rehabilitated roads, highways, and bridges. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measures and will have some flexibility in doing so. The application of measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

Substantial amounts of eroded material and other pollutants can be generated by operation and maintenance procedures for roads, highways, and bridges, and from sparsely vegetated areas, cracked pavements, potholes, and poorly operating urban runoff control structures. This measure is intended to ensure that pollutant loadings from roads, highways, and bridges are minimized by the development and implementation of a program and associated practices to ensure that sediment and toxic substance loadings from operation and maintenance activities do not impair coastal surface waters. The program to be developed, using the practices described in this management measure, should consist of and identify standard operating procedures for nutrient and pesticide management, road salt use minimization, and maintenance guidelines (e.g., capture and contain paint chips and other particulates from bridge maintenance operations, resurfacing, and pothole repairs).

3. Management Measure Selection

This management measure for operation and maintenance was selected because (1) it is recommended by FHWA as a cost-effective practice (FHWA, 1991); (2) it is protective of the human environment (Puget Sound Water Quality Authority, 1989); (3) it is effective in controlling erosion by revegetating bare slopes (AASHTO, 1991b); (4) it is helpful in minimizing polluted runoff from road pavements (Transportation Research Board, 1991); and (5) both Federal (Richardson, 1974) and State highway agencies (Minnesota Pollution Control Agency, 1989; Pitt, 1973) advocate highway maintenance as an effective practice for minimizing pollutant loadings.

Maintenance of erosion and sediment control practices is of critical importance. Both temporary and permanent controls require frequent and periodic cleanout of accumulated sediment. Any trapping or filtering device, such as silt fences, sediment basins, buffers, inlets, and check dams, should be checked and cleaned out when approximately 50 percent of their capacity is reached, as determined by the erodible nature of the soil, flow velocity, and quantity of runoff. Seasonal and climatic differences may require more frequent cleanout of these structures. The sediments removed from these control devices should be deposited in permanently stabilized areas to prevent further erosion and sediment from reaching drainages and receiving streams. After periods of use, control devices may require replacement of deteriorated materials such as straw bales and silt fence fabrics, or restoration and reconstruction of sediment basins and riprap installations.

Permanent erosion controls such as vegetated filter strips, grassed swales, and velocity dissipators should be inspected periodically to determine their integrity and continued effectiveness. Continual deterioration or damage to these controls may indicate a need for better design or construction.

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully apply to achieve the management measure described above.

a. *Seed and fertilize, seed and mulch, and/or sod damaged vegetated areas and slopes.*

b. *Establish pesticide/herbicide use and nutrient management programs.*

Refer to the Management Measure for Construction Site Chemical Control in this chapter.

c. *Restrict herbicide and pesticide use in highway rights-of-way to applicators certified under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to ensure safe and effective application.*

d. *The use of chemicals such as soil stabilizers, dust palliatives, sterilants, and growth inhibitors should be limited to the best estimate of optimum application rates. All feasible measures should be taken to avoid excess application and consequent intrusion of such chemicals into surface runoff.*

e. *Sweep, vacuum, and wash residential/urban streets and parking lots.*

f. *Collect and remove road debris.*

g. *Cover salt storage piles and other deicing materials to reduce contamination of surface waters. Locate them outside the 100-year floodplain.*

h. *Regulate the application of deicing salts to prevent oversalting of pavement.*

i. *Use specially equipped salt application trucks.*

j. *Use alternative deicing materials, such as sand or salt substitutes, where sensitive ecosystems should be protected.*

k. *Prevent dumping of accumulated snow into surface waters.*

l. *Maintain retaining walls and pavements to minimize cracks and leakage.*

m. *Repair potholes.*

n. *Encourage litter and debris control management.*

o. *Develop an inspection program to ensure that general maintenance is performed on urban runoff and NPS pollution control facilities.*

To be effective, erosion and sediment control devices and practices must receive thorough and periodic inspection checks. The following is a suggested checklist for the inspection of erosion and sediment controls (AASHTO Operating Subcommittee on Design, 1990):

- Clean out sediment basins and traps; ensure that structures are stable.
- Inspect silt fences and replace deteriorated fabrics and wire connections; properly dispose of deteriorated materials.
- Renew riprapped areas and reapply supplemental rock as necessary.
- Repair/replace check dams and brush barriers; replace or stabilize straw bales as needed.
- Regrade and shape berms and drainage ditches to ensure that runoff is properly channeled.
- Apply seed and mulch where bare spots appear, and replace matting material if deteriorated.
- Ensure that culverts and inlets are protected from siltation.
- Inspect all permanent erosion and sediment controls on a scheduled, programmed basis.

p. *Ensure that energy dissipators and velocity controls to minimize runoff velocity and erosion are maintained.*

q. *Dispose of accumulated sediment collected from urban runoff management and pollution control facilities, and any wastes generated during maintenance operations, in accordance with appropriate local, State, and Federal regulations.*

r. *Use techniques such as suspended tarps, vacuums, or booms to reduce, to the extent practicable, the delivery to surface waters of pollutants used or generated during bridge maintenance (e.g., paint, solvents, scrapings).*

s. *Develop education programs to promote the practices listed above.*

5. Effectiveness Information and Cost Information

Preventive maintenance is a time-proven, cost-effective management approach. Operation schedules and maintenance procedures to restore vegetation, proper management of salt and fertilizer application, regular cleaning of urban runoff structures, and frequent sweeping and vacuuming of urban streets have effective results in pollution control. Litter control, clean-up, and fix-up practices are a low-cost means for eliminating causes of pollution, as is the proper handling of fertilizers, pesticides, and other toxic materials including deicing salts and abrasives. Table 4-30 presents summary information on the cost and effectiveness of operation and maintenance practices for roads, highways, and bridges. Many States and communities are already implementing several of these practices within their budget limitations. As shown in Table 4-30, the use of road salt alternatives such as calcium magnesium acetate (CMA) can be very costly. Some researchers have indicated, however, that reductions in corrosion of infrastructure, damage to roadside vegetation, and the quantity of material that needs to be applied may offset the higher cost of CMA. Use of road salt minimization practices such as salt storage protection and special salt spreading equipment reduces the amount of salt that a State or community must purchase. Consequently, implementation of these practices can pay for itself through savings in salt purchasing costs. Similar programs such as nutrient and pesticide management can also lead to decreased expenditures for materials.

CMA Eligible for Matching Funds

Calcium magnesium acetate (CMA) is now eligible for Federal matching funds under the Bridge Program of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The Act provides 80 percent funding for use of CMA on salt-sensitive bridges in order to protect against corrosion and to extend their useful life. CMA can also be used to protect vegetation from salt damage in environmentally sensitive areas.

Table 4-30. Effectiveness and Cost Summary for Roads, Highways, and Bridges Operation and Maintenance Management Practices

Management Practice	% Removal TSS	TP	TN	COD	Pb	Zn	Cost
MAINTAIN VEGETATION							
For Sediment Control							Natural succession allowed to occur -
Average:	90	NA	NA	NA	NA	NA	Avg: $100/ac/year
Reported Range:	50-100	NA	NA	NA	NA	NA	Reported Range: $50-$200/ac/year
Probable Range:	80-100	-	-	-	-	-	
For Pollutant Removal							Natural succession not allowed to occur -
Average:	60	40	40	50	50	50	Avg: $800/ac/year
Reported Range	0-100	0-100	0-70	20-80	0-100	50-60	Reported Range: $700-$900/ac/year
Probable Range:	0-100	0-100	0-100	0-100	0-100	0-100	
PESTICIDE/HERBICIDE USE MANAGEMENT							Generally accepted as an economical program to control excessive use
Average:	NA						
Reported Range:	NA						
Probable Range:							
STREET SWEEPING							
Smooth Street, Frequent Cleaning (One or More Passes Per Week)							Avg: $20/curb mile Reported Range: $10-$30/curb mile
Average:	20	NA	NA	5	25	NA	
Reported Range:	20	NA	NA	0-10	5-35	NA	
Probable Range:	20-50	-	-	0-10	20-50	10-30	
Infrequent Cleaning (One Pass Per Month or Less)							
Average:	NA	NA	NA	NA	5	NA	
Reported Range:	NA	NA	NA	NA	0-10	NA	
Probable Range:	0-20	-	-	-	0-20	0-10	
LITTER CONTROL							Generally accepted as an economical approach to control excessive use
Average:	NA						
Reported Range:	NA						
Probable Range:							

Table 4-30. (Continued)

Management Practice	% Removal TSS	TP	TN	COD	Pb	Zn	Cost
GENERAL MAINTENANCE (e.g., pothole and roadside repairs)							Generally accepted as an economical preventive maintenance program by local and State agencies
Average:	NA						
Reported Range:	NA						
Probable Range:							
PROTECTION OF SALT PILES							For salt storage building -
Average:	NA						Ave: $30/ton salt
Reported Range:	NA						Reported Range: $10-$70/ton salt
Probable Range:	90-100[a]						
MINIMIZATION OF APPLICATION OF DEICING SALTS							Generally accepted as an economical preventive maintenance program by local and State agencies
Average:	NA						
Reported Range:	NA						
Probable Range:	Deicing salts that are not applied to roads will not enter runoff[a]						
SPECIALLY EQUIPPED SALT APPLICATION TRUCKS							For spread rate control on truck - Ave: $6,000/truck
Average:	NA						Reported Range: $6,000/truck
Reported Range:	NA						
Probable Range:	Deicing salts that are not applied to roads will not enter runoff[a]						
USE OF ALTERNATIVE DEICING MATERIALS							CMA - Ave: $650/ton
Average:	NA						Reported Range: $650/ton
Reported Range:	NA						(note: cost of salt $30/ton)
Probable Range:	Deicing salts that are not applied to roads will not enter runoff[a]						
CONTAIN POLLUTANTS GENERATED DURING BRIDGE MAINTENANCE							Varies with method of containment use
Average:	NA						
Reported Range:	NA						
Probable Range:	50-100[b]						

NA = Not applicable.
[a]Measured as reduction in salt.
[b]Measured as reduction of all pollutants.

F. Management Measure for Road, Highway, and Bridge Runoff Systems

Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

(1) Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures; and

(2) Establish schedules for implementing appropriate controls.

1. Applicability

This management measure is intended to be applied by States to existing, resurfaced, restored, and rehabilitated roads, highways, and bridges that contribute to adverse effects in surface waters. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

This measure requires that operation and maintenance systems include the development of retrofit projects, where needed, to collect NPS pollutant loadings from existing, reconstructed, and rehabilitated roads, highways, and bridges. Poorly designed or maintained roads and bridges can generate significant erosion and pollution loads containing heavy metals, hydrocarbons, sediment, and debris that run off into and threaten the quality of surface waters and their tributaries. In areas where such adverse impacts to surface waters can be attributed to adjacent roads or bridges, retrofit management projects to protect these waters may be needed (e.g., installation of structural or nonstructural pollution controls). Retrofit projects can be located in existing rights-of-way, within interchange loops, or on adjacent land areas. Areas with severe erosion and pollution runoff problems may require relocation or reconstruction to mitigate these impacts.

Runoff management systems are a combination of nonstructural and structural practices selected to reduce nonpoint source loadings from roads, highways, and bridges. These systems are expected to include structural improvements to existing runoff control structures for water quality purposes; construction of new runoff control devices, where necessary to protect water quality; and scheduled operation and maintenance activities for these runoff control practices. Typical runoff controls for roads, highways, and bridges include vegetated filter strips, grassed swales, detention basins, constructed wetlands, and infiltration trenches.

3. Management Measure Selection

This management measure was selected because of the demonstrated effectiveness of retrofit systems for existing roads and highways that were constructed with inadequate nonpoint source pollution controls or without such controls. Structural practices for mitigating polluted runoff from existing highways are described in the literature (Silverman, 1988).

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

a. *Locate runoff treatment facilities within existing rights-of-way or in medians and interchange loops.*

b. *Develop multiple-use treatment facilities on adjacent lands (e.g., parks and golf courses).*

c. *Acquire additional land for locating treatment facilities.*

d. *Use underground storage where no alternative is available.*

e. *Maximize the length and width of vegetated filter strips to slow the travel time of sheet flow and increase the infiltration rate of urban runoff.*

5. Effectiveness Information and Cost Information

Cost and effectiveness data for structural urban runoff management and pollution control facilities are outlined in Tables 4-15 and 4-16 in Section III and discussed in Section IV of this chapter and are applicable to determine the cost and effectiveness of retrofit projects. Retrofit projects can often be more costly to construct because of the need to locate the required structures within existing space or the need to locate the structures within adjacent property that requires purchase. However, the use of multiple-use facilities on adjacent lands, such as diverting runoff waters to parkland or golf courses, can offset this cost. Nonstructural practices described in the urban section also can be effective in achieving source control. As with other sections of this document, the costs of loss of habitat, fisheries, and recreational areas must be weighed against the cost of retrofitting control structures within existing rights-of-way.

6. Pollutants of Concern

Table 4-31 lists the pollutants commonly found in urban runoff from roads, highways, and bridges and their sources. The disposition and subsequent magnitude of pollutants found in highway runoff are site-specific and are affected by traffic volume, road or highway design, surrounding land use, climate, and accidental spills.

The FHWA conducted an extensive field monitoring and laboratory analysis program to determine the pollutant concentration in highway runoff from 31 sites in 11 States (Driscoll et al., 1990). The event mean concentrations (EMCs) developed in the study for a number of pollutants are presented in Table 4-32. The study also indicated that for highways discharging into lakes, the pollutants of major concern are phosphorus and heavy metals. For highways discharging into streams, the pollutants of major concern are heavy metals—cadmium, copper, lead, and zinc.

Table 4-31. Highway Runoff Constituents and Their Primary Sources

Constituents	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere, maintenance
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Leaded gasoline (auto exhaust), tire wear (lead oxide filler material, lubricating oil and grease, bearing wear)
Zinc	Tire wear (filler material), motor oil (stabilizing additive), grease
Iron	Auto body rust, steel highway structures (guard rails, bridges, etc.), moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, break lining wear
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound (ferric ferrocyanide, sodium ferrocyanide, yellow prussiate of soda) used to keep deicing salt granular
Sodium, Calcium, Chloride	Deicing salts
Sulphate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate

In colder regions where deicing agents are used, deicing chemicals and abrasives are the largest source of pollutants during winter months. Deicing salt (primarily sodium chloride, NaCl) is the most commonly used deicing agent. Potential pollutants from deicing salt include sodium chloride, ferric ferrocyanide (used to keep the salt in granular form), and sulfates such as gypsum. Table 4-33 summarizes potential environmental impacts caused by road salt. Other chemicals used as a salt substitute include calcium magnesium acetate (CMA) and, less frequently, urea and glycol compounds. Researchers have differing opinions on the environmental impacts of CMA compared to those of road salt (Chevron Chemical Company, 1991; Salt Institute, undated; Transportation Research Board, 1991).

Table 4-32. Pollutant Concentrations in Highway Runoff (Driscoll et al., 1990)

Pollutant	Event Mean Concentration for Highways With Fewer Than 30,000 Vehicles/Day[a] (mg/L)	Event Mean Concentration for Highways With More Than 30,000 Vehicles/Day[a] (mg/L)
Total Suspended Solids	41	142
Volatile Suspended Solids	12	39
Total Organic Carbon	8	25
Chemical Oxygen Demand	49	114
Nitrite and Nitrate	0.46	0.76
Total Kjeldahl Nitrogen	0.87	1.83
Phosphate Phosphorus	0.16	0.40
Copper	0.022	0.054
Lead	0.080	0.400
Zinc	0.080	0.329

[a]Event mean concentrations are for the 50% median site.

Table 4-33. Potential Environmental Impacts of Road Salts

Environmental Resource	Potential Environmental Impact of Road Salt (NaCl)
Soils	May accumulate in soil. Breaks down soil structure, increases erosion. Causes soil compaction that results in decreased permeability.
Vegetation	Osmotic stress and soil compaction harm root systems. Spray causes foliage dehydration damage. Many plant species are salt-sensitive.
Ground Water	Mobile Na and Cl ions readily reach ground water. Increases NaCl concentration in well water, as well as alkalinity and hardness.
Surface Water	Causes density stratification in ponds and lakes that can prevent reoxygenation. Increases runoff of heavy metals and nutrients through increased erosion.
Aquatic Life	Monovalent Na and Cl ions stress osmotic balances. Toxic levels: Na - 500 ppm for stickleback; Cl - 400 ppm for trout.
Human/Mammalian	Sodium is linked to heart disease and hypertension. Chlorine causes unpleasant taste in drinking water. Mild skin and eye irritant. Acute oral LD_{50} in rats is approximately 3,000 mg/kg (slightly toxic).

MASSACHUSETTS NONPOINT SOURCE MANAGEMENT MANUAL

"THE MEGAMANUAL"

A GUIDANCE DOCUMENT FOR MUNICIPAL OFFICIALS

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APPENDIX C

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November 8, 2002

David Craddick, Director
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

Subject: Waiohonu Bridge Replacement, Hana Maui

Dear Mr. Craddick:

Thank you very much for your comment letter dated April 16, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

Our project engineers will contact the Department's Engineering Division to discuss upgrading the 4-inch water line beneath the Waiohonu Bridge. We will also work with your staff to arrange alternative water service for residents in the vicinity of the project area during the construction period. In addition, appropriate Best Management Practices will be implemented during project construction to protect the integrity of surface and groundwater resources underlying the project site.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:tn

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\dwsltr.001

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

May 16, 2002

Mr. Clyde Morimoto, Project Manager
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawaii 96793

Dear Mr. Morimoto:

RE: Environmental Assessment (EA) Pre-Assessment Consultation for Waiohonu Bridge Replacement, Hana, Maui

Thank you for the opportunity to provide you with pre-assessment comments on this project. Please discuss the following in the draft EA:

1. The document should also discuss repair of the bridge as an alternative to the proposed action.

2. It appears from the information provided that a temporary bridge on the makai side of the road would be a less disruptive alternative. The EA should select a preferred alternative and explain the rationale.

3. Since diverting the road will likely involve grading and fill, the EA should discuss the scope, impacts, and mitigation measures.

4. Visually, the new bridge should match the existing structure to the degree possible. Special attention should be given to the railings.

If you have any questions, please contact Mr. William Spence, Staff Planner, of this office at 270-7735.

Very truly yours,

JOHN E. MIN
Planning Director

RECEIVED
MAY 21 2002
SATO & ASSOCIATES, INC
Maui Office

250 SOUTH HIGH STREET, WAILUKU, MAUI, HAWAII 96793
PLANNING DIVISION (808) 270-7735; ZONING DIVISION (808) 270-7253; FACSIMILE (808) 270-7634

Quality Seamless Service - Now and for the Future

JEM:WRS:cmb
c: Clayton Yoshida, AICP, Deputy Planning Director
William Spence, Staff Planner
David Goode, Director, DPWWM
General File
(S:\ALL\WILL\AACORESP\2002\waiohonu.wpd)

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

John E. Min, Director
County of Maui
Department of Planning
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Mr. Min:

Thank you for your comment letter dated May 16, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

1. The Draft Environmental Assessment (EA) will discuss repair of the Waiohonu Bridge as an alternative to the proposed action;

2. The EA will include discussion regarding the mauka and makai temporary detour road and bridge, including the rational for the preferred alternative;

3. The EA will include discussion of the scope, impacts and mitigation measures of the temporary roadway; and

4. Proposed project plans call for the reconstructed bridge to match the existing bridge structure, as recommended by the Final Preservation Plan for County Bridges within the Hana Highway Historic District.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

s:\sato\waiohonu\pd.ltr

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

THOMAS M. PHILLIPS
CHIEF OF POLICE

KEKUHAUPIO R. AKANA
DEPUTY CHIEF OF POLICE

April 24, 2002

Mr. Clyde Morimoto
Project Manager
Sato & Associates, Inc.
2115 Wells Street
Wailuku, HI 96793

Dear Mr. Morimoto:

SUBJECT: Waiohonu Bridge Replacement
Hāna, Maui

Thank you for your letter of April 8, 2002, requesting comments on the above subject.

We have reviewed the proposed summary and have enclosed our comments and recommendations. Thank you for giving us the opportunity to comment on the proposed project.

Very truly yours,

Assistant Chief Robert Tam Ho
for: Thomas M. Phillips
Chief of Police

Enclosure

c: John E. Min, Planning Department
Joe Kruger, Public Works and Waste Management

COPY

TO : THOMAS PHILLIPS, CHIEF OF POLICE, MAUI COUNTY POLICE DEPARTMENT

A-4
4/24/02

VIA : CHANNELS

FROM : HAMILTON RODRIGUES, LIEUTENANT, HANA DISTRICT

SUBJECT : WAIOHONU BRIDGE REPLACEMENT PROJECT

SATO and Associates, Inc. is requesting written comments from the police pertaining to a project to replace Waiohonu Bridge, which is located on Hana Highway, approximately 5 miles south of Hana Town in Hana, Maui.

The project is considering utilizing a temporary single lane detour roadway and bridge on the mauka or makai side of the existing bridge to provide continued vehicular movement on Hana Highway during the construction of this new replacement bridge.

The police concerns for this project are that the emergency services agencies, police, fire and medics are informed, as soon as possible, when the construction is scheduled to begin. Public notification of the upcoming project should be done through the media. Traffic and construction area signs should be properly placed advising motorists of this project. Traffic control personnel should be utilized to insure that motorist will be guided safely through the construction area. The last issue recommended is that access for emergency services vehicles to proceed through the construction project, even when the roadway is completely closed, should be included in the plan. It is vitally important that emergency services agencies be able to proceed through the project with minimal delay should emergency services be necessary for someone located further south of the project.

This report is submitted for your perusal.

Respectfully,

Lt. Hamilton RODRIGUES E-7442
Hana District Commander
04/17/02 @ 0930 Hours

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

November 8, 2002

Thomas M. Phillips, Chief of Police
County of Maui
Department of Police
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Chief Phillips:

Thank you for your comment letter dated April 24, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

1. Appropriate coordination with emergency service agencies will be initiated as soon as it is practical;

2. The public will be notified of plans for project construction via local media sources;

3. Traffic and construction signs will be properly placed to advise motorist of construction;

4. Traffic control personnel will be utilized, as necessary; and

5. During construction, one traffic lane will remain open at all times ensuring access for emergency service agencies.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management
sato\waiohonu\mpd.ltr

Subject: Clyde Morimoto, Waiohonu Bridge.
From: "Mario Chajon" <mario@bmwhawaii.com>
Date: Fri, 12 Apr 2002 11:25:12 -1000
To: <maui@satoandassociates.com>

First of all, I am in favor of constructing a new bridge. However, instead of using the money to provide an environmental study, the money could be better used to provide a lobotomy for the engineers, architects, legislators and builders involved in the project.

We have the technology and know how for building bridges.
If you are spending Millions of Dollars in studies and construction do it right the first time and DO NOT ADD ONLY 8" to the new structure. Make the bridge better, safer, efficient, and something to be proud of. Not something the community will ridicule. If the bridge is only expanded 8" leave it alone. Let it stand and let it be a piece of History. A bridge we are proud of now because it has provided passage for decades and decades. Do not destroy it and insult the intelligence of Maui residents and the rest of the State and all those who will read of the proposal and laugh at the idea of destroying and existing structure, constructing a bypass structure and then adding 8" to the NEW BRIDGE.

If a NEW BRIDGE goes up, and it should, it should be TWO LANES. It should be one which will provide safe passage for decades and decades...wait that sounds like the bridge we now have...

Best regards.
Mario F. Chajon

November 8, 2002

VIA E-MAIL

Mario Chajon
mario@bmwhawaii.com

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Mr. Chajon:

Thank you for your e-mail comments dated April 12, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

Plans for the proposed reconstruction have been designed in accordance with the Final Preservation Plan for County Bridges Within the Hana Highway Historic District. The purpose of the proposed project is to improve the safety and stability of the Waiohonu Bridge while maintaining, to the greatest extent practical, it's unique and defining historic characteristics. Waiohonu Bridge is noted for it's one lane traffic capacity, its open balustrade type railings and its capped rails. All three of these design concepts have been incorporated into the preliminary project plans to construct a safe bridge while respecting the structure's historic nature.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\mario.ltr

Subject: waiohonu bridge
From: biglake@webtv.net (John Vaughn)
Date: Sat, 13 Apr 2002 06:41:20 -0400 (EDT)
To: maui@satoandassociates.com

STOP THE DESTRUCTION how can the gain of six inches be justified by the loss of 87 yrs. of history i live adjacent to the waiohonu and use the bridge daily it is safe spend our money on more important construction such as paving the road to kapo thanks

john vaughn m. d.
p.o.box
910
hana hi.
96713

November 8, 2002

VIA E-MAIL

John Vaughn
biglake@webtv.net

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Mr. Vaughn:

Thank you for your e-mail comments dated April 13, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

Plans for the proposed reconstruction have been designed in accordance with the Final Preservation Plan for County Bridges within the Hana Highway Historic District. The purpose of the proposed project is to improve the safety and stability of the Waiohonu Bridge while maintaining, to the greatest extent practical, it's unique and defining historic characteristics. Waiohonu Bridge is noted for it's one lane traffic capacity, its open balustrade type railings and its capped rails. All three of these design concepts have been incorporated into the preliminary project plans to construct a safe bridge while respecting the structures historic nature.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\vaughn\vaughn.ltr

Subject: Comments On Waiohonu Bridge
From: "Christopher Perreira" <cjperreira@hotmail.com>
Date: Mon, 15 Apr 2002 15:38:01 -1000
To: maui@satoandassociates.com
CC: cjperreira@hotmail.com

Dear Sato & Associates Inc.,

I'm against one lane bridges, such as your current plan for the Waiohonu Bridge located in the Hana area. The Waiohonu Bridge was built in 1915 and is 15.4 feet wide. The plan is to widen this bridge to 16 feet wide. This is insufficient and unsafe. This one lane bridge exposes the County of Maui to lawsuits from car accidents. I believe a trial lawyer would win a liability lawsuit against the County of Maui.

A two lane Waiohonu Bridge is safer and not a liability to the County of Maui. It should be wide enough for big trucks, buses, etc. to pass through safely. The toursits standing on the side of the bridge taking pictures of the waterfalls, etc., would be safer from the traffic passing through the bridge. The Waiohonu Bridge (and all other brigdes in the County of Maui) should be two lane bridges with a minimum of 32 feet width. These new bridges should be designed in their current old fashion looking style, so they would still have a historical look to them. Thank you for letting me comment on this very important issue.

November 8, 2002

VIA E-MAIL

Mr. Christopher Perreira
cjperreira@hotmail.com

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Mr. Perreira:

Thank you for your e-mail comments dated April 15, 2002 regarding the subject project. In response to your comments, we would like to note the following.

The proposed project is being designed in accordance with guidelines and recommendations set forth in the Final Preservation Plan for County Bridges within the Hana Highway Historic District. The purpose of the proposed project is to improve the safety and stability of the Waiohonu Bridge while maintaining, to the greatest extent practical, its unique and defining historic characteristics. In particular, the design recommendations in the Preservation Plan calls for a 16-ft. railing-to-railing width.

In the context of the Hana Highway Historic District objectives, the proposed design is considered the preferred alternative.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manger

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\perreira.ltr

Subject: Waiohonu Bridge
From: linda domen <kaupostore@yahoo.com>
Date: Wed, 8 May 2002 12:32:18 -0700 (PDT)
To: maui@satoandassociates.com

Aloha -

Thank you for contacting us regarding the affect of the bridge repair on our business. Any closure or rumor of closure will have a negative effect on us. We rely solely on the passing traffic to sustain our business - Kaupo General Store. When the road closes, we have no customers. No customers means no income...you know the rest. If there was a time that the road had to be closed, a Sunday would least affect us. A continual by-pass is what we are strongly hoping for, for the duration of the repairs on this and any bridge.

We appreciate that the original railing style will be used, please keep it as close to the original look as possible. No monster bridges please. It would be nice if somewhere the "original" date could be inscribed, for the sake of history.

Less is better as far as sinage, lines, reflectors. In a rural setting, those things are actually distracting, and not complimentary to the surrounding beauty.

Linda & Mani Domen

Proprietors - Kaupo General Store

November 8, 2002

VIA E-MAIL

Linda and Mani Domen
kaupostore@yahoo.com

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Linda and Mani:

Thank you for your e-mail comments dated May 8, 2002 regarding the subject project. In response to your comments, we would like to note the following.

1. A temporary detour road will be installed to allow for the safe and continuous passage of traffic during the construction period. While drivers may experience temporary delays, there will be no road closures in connection with the proposed action.

2. The proposed project is being designed in accordance with guidelines and recommendations set forth in the Final Preservation Plan for County Bridges within the Hana Highway Historic District. The purpose of the proposed project is to improve the safety and stability of the Waiohonu Bridge while maintaining, to the greatest extent practical, its unique and defining historic characteristics.

3. Signage will be provided to the extent required to ensure public safety and well-being.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\domen.ltr

Subject: Re: Waiohonu Bridge
From: "Dawn Duensing" <historiandawn@hotmail.com>
Date: Thu, 09 May 2002 02:45:03 +0000
To: maui@satoandassociates.com
CC: joe.krueger@co.maui.hi.us, historiandawn@hotmail.com

Sato & Associates
2115 Wells Street
Wailuku, HI 96793

Attn: Mr. Clyde Morimoto

Dear Mr. Morimoto:

This letter is a response to your request for a Pre-Assessment Consultation for the Draft Environmental Assessment for the proposed replacement of Waiohonu Bridge.

As with many of the other bridges the County intends to demolish, I strongly object to the replacement of Waiohonu Bridge. I commend the County's efforts to maintain the character and feeling of the historic Hana Belt Road by replacing bridges with 16'-wide structures. I disagree, however, that nearly one-half of the bridges should be replaced.

It is important to realize that maintaining the character and historic integrity of the Hana Belt Road National Historic District involves much more than simply replacing structures in kind. The County's preservation plan calls for the replacement of six or seven bridges, with three or four proposed for significant modifications. In all, ten of fourteen bridges in the eleven-mile section of the Hana Belt Road National Historic District are proposed to be demolished or significantly altered, which poses a significant threat to the road's historic integrity. The road has been on the National Register less than one year, and the County of Maui still appears to misunderstand the concept of historic integrity. Replacement and alteration of such a high percentage of contributing structures threatens the historic character of the road and the district's recognition on the National Register.

I strongly urge the county to reconsider what it believes to be "preservation" of the road's character. The Department of Public Works is moving this bridge program forward at an alarming rate. It is discouraging that the county rejects the possibilities offered by modern technology and materials to rehabilitate at least some of the historic structures. Many states on the mainland are taking action to preserve historic bridges, and I believe that the county's claim that it cannot rehabilitate bridges is taking the easy way out of a challenging situation. Indeed, our Hawaii Department of Transportation has continued to maintain and rehabilitate the bridges in its jurisdiction of the Hana Belt Road.

Once again, I urge the Department of Public Works to consult with a bridge engineering firm with experience and a reputation in historic bridge rehabilitation so that the DPWWM may reconsider its program to replace approximately half of the bridges in the county-maintained section of the National Register Historic District. Please consider the available options to rehabilitate and preserve Waiohonu Bridge, one of the more distinctive bridges in the County's jurisdiction.

Thank you for this opportunity to comment.

Sincerely,

Dawn E. Duensing

November 8, 2002

VIA E-MAIL

Ms. Dawn Duensing
historiandawn@hotmail.com

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Ms. Duensing:

Thank you for your e-mail comments dated May 9, 2002 regarding the subject project. In response to your comments, we would like to note the following.

Design alternatives, *including the rehabilitation of the existing bridge, were carefully* considered and analyzed. In undertaking the design assessment, it was determined that hydraulic constraints associated with limited flow capacity of the existing bridge opening, as well as structural deficiencies of the existing bridge, required full reconstruction. Both issues were reviewed in terms of safety and health considerations to the traveling public, as well as surrounding landowners. Accordingly, the design of the new bridge will adhere to the recommendations of the Final Preservation Plan for County of Maui Bridges within the Hana Highway Historic District.

Thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manager

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\duensing.ltr

Subject: Waiohonu Bridge replacement comment letter, Kipahulu Community Association
From: "Lisa Hamilton" <lisaham@aloha.net>
Date: Tue, 7 May 2002 08:45:41 -0700
To: <maui@satoandassociates.com>

KIPAHULU COMMUNITY ASSOCIATION, INC.

S.R.BOX 190 HANA, HI 96713

v. 808.248.8385 f. 808.248.8001

May 5, 2002

Sato & Associates, Inc.

2115 Wells Street,

Wailuku, HI, 96793

Via e-mail: maui@satoandassociates.com

Re.: Waiohonu Bridge Replacement Proposal, comment on the Pre-Assessment consultation letter.

Dear Mr. Morimoto:

We appreciate this opportunity to comment at this phase of the EA/EIS process concerning the proposal to replace Waiohonu Bridge, one of the many historic bridges along our famous East Maui highway.

As you are aware, Waiohonu Bridge is in the portion of the Hana Highway listed on the National Register of Historic Places as Hana Belt Road Historic District. Maui County jurisdiction extends over only about 12 miles of this approximate 40-mile linear historic site. The county section which stretches from Kaholopo'o Bridge above Koki Beach on the Kipahulu side of Hana to Koukouai in Kipahulu, contains 16 historic bridges. (Of these 16 bridges, the county considers it has jurisdiction over only 14 because, it asserts, Federal jurisdiction applies to the bridges at Ohe'o and Paulu'u near Haleakala Part at Ohe'o Gulch. The balance of bridges within the historic district is under state of Hawaii jurisdiction. The Historic District extends from Holua Bridge near the 3-mile marker to Koukouai Bridge in Kipahulu, a stretch of over 40 miles.)

Six of the bridges, or almost half under the care of Maui County, are slated for replacement as evidenced under "Road improvements" in the year 2003 proposed county budget. The bridges slated for replacement in addition to Waiohonu are Kaholopo'o, Kahawaiokapia, Papa'ahawahawa, Paihi and Koukouai. In each case federal funding is involved.

Therefore the first question we request be addressed would be this: would not federal environmental law be triggered for the review of this replacement work?

Furthermore, would not the review process defined by Hawaii State environmental law at Chapter 343 of HRS require that the replacement of all six bridges need be considered as one larger proposal, while review of each bridge on a case by case, piecemeal basis be an example of "segmentation"?

According to the rules at Chapter 200 of Administration Rules defines segmentation as "a group of actions proposed by an agency or applicant shall be treated as single action when:

The component actions are phases of increments of a larger total undertaking;

The actions in question are essentially identical and a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole."

The point is that by evaluating each of the six bridges individually obscures the impact of the overall program. With so many of the quaint, unique bridges to be destroyed, suggests that the county fails to recognize the importance of the Hana Highway Historic District designation. In so doing the historic designation itself may become jeopardized. Additionally the county would seem to be failing to take advantage of the federal funding for maintenance and preservation that may have become available. Maintenance and preservation work could have local economic value and at the same time, promote understanding and appreciation of the area's history.

According to estimates generated by the park at Oheo Gulch, last year, 600,000 tourists drove the Hana Highway to visit. Thus, the unique and charming Historic Hana Highway is one of Maui's premier, year-round tourist attractions, exceeding in economic value even the $ millions generated by whale watching.

Furthermore the bridge replacement policy necessitates the construction of by-pass bridges during the process. Inevitably this would have the unfortunate effect of altering bridge approaches, causing neighborhood disruption and producing a lasting scar after the work is complete.

It is quite possible that repair work can be accomplished without closing the bridge and thus maintain the historic melieu, which is so much a part of the character and beauty of the area. According to experts, preservation technology is further advanced than new bridge construction. An example of a firm capable of doing such work is Structural Concrete Bonding and Restoration, Inc. of Wailuku. The firm has already done quality work on bridges in Maui County. A bridge at Wailua is an example of this preservation work.

Thank you in advance for your consideration of these points.

Respectfully submitted

KIPAHULU COMMUNITY ASSOCIATION, INC.

By

Lisa Hamilton, it's Vice President.

November 8, 2002

VIA E-MAIL

Lisa Hamilton, Vice President
Kipahulu Community Association, Inc.
lisaham@aloha.net

SUBJECT: Waiohonu Bridge Replacement, Hana, Maui

Dear Ms. Hamilton:

Thank you for your e-mail comments dated May 9, 2002 regarding the subject project. In response to your comments, we would like to note the following.

1. As Federal Funding for the project is anticipated, Federal environmental review pursuant to the National Environmental Policy Act will be required.

2. The context of the proposed Waiohonu Bridge project is defined by the Final Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District. This plan assesses Historic District bridges in terms of work required to ensure the continued long-term functional and structural integrity of the bridge structures. As with other County of Maui capital improvements projects, work within the Hana Historic District is being programmed in order of priority, which in this case, is based on findings and recommendations contained in the Preservation Plan. The ongoing need to rehabilitate bridges County-wide is viewed comprehensively in terms of funding and need priorities. However, the County has held that this approach to capital programming within the Hana Historic District is not intended to represent, nor does it comprise a single, larger action.

3. The design for the replacement of Waiohonu Bridge will be in accordance with recommendations and guidelines set forth in the Preservation Plan to ensure consistency of historic character throughout the Hana Historic District.

4. A temporary detour crossing will be installed to facilitate reconstruction of the Waiohonu Bridge. Design of the detour will incorporate appropriate best management practices to insure that impacts of the detour to the environment and surrounding properties are minimized.

5. Design alternatives, including the rehabilitation of the existing bridge, were carefully considered and analyzed. In undertaking the design assessment, it was determined that hydraulic constraints associated with limited flow capacity of the exiting bridge opening, as well as structural deficiencies of the existing bridge,

required full reconstruction. Both issues were reviewed in terms of safety and health considerations to the traveling public as surrounding landowners. As noted earlier, the design of the new bridge will adhere to the recommendations of the Final Preservation Plan for County of Maui Bridges within the Hana Highway Historic District.

Thank you for our interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265

Sincerely,

SATO & ASSOCIATES, INC.

Clyde H. Morimoto

CLYDE MORIMOTO
Construction Manger

CM:yp

cc: Joe Krueger, Department of Public Works and Waste Management

sato\waiohonu\hamilton.ltr

XIII. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT COMMENT PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS

53/195

United States Department of Agriculture

USDA

NRCS Natural Resources Conservation Service

Our People...Our Islands...In Harmony
210 Imi Kala Street, Suite #209, Wailuku, HI 96793-2100

Date: January 13, 2003

Mr. Michael W. Foley, Director
County of Maui
Department of Planning
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Foley,

SUBJECT: Waiohonu Bridge; TMK: 1-4-012: 019
I.D.: SM1 2002/0025

We have no comments.

Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara
District Conservationist

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF: CEPOH-EC-T

January 21, 2003

Civil Works Technical Branch

'03 JAN 21 P2:57

Ms. Robyn L. Loudermilk, Staff Planner
County of Maui
Department of Planning
250 South High Street
Wailuku, Maui, Hawaii 96793

Dear Ms. Loudermilk:

Thank you for the opportunity to review and comment on the Special Management Area Application and Draft Environmental Assessment (DEA) for the Waiohonu Bridge Replacement Project, Hana, Maui (TMK 1-4-12: 19). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, a DA permit will be required for the project. For further information, please contact Mr. William Lennan of our Regulatory Branch at (808) 438-6986 and refer to file number 200300204.

b. The flood hazard information provided on page 14 of the DEA is correct.

Should you require additional information, please contact Ms. Jessie Dobinchick of my staff at (808) 438-8876.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

February 20, 2003

James Pennaz, P.E., Chief
Civil Works, Technical Branch
Department of the Army, Engineer District
Attn: Operations Division
Bldg. T-1, Room 105
Fort Shafter, Hawaii 96858-5440

SUBJECT: Proposed Waiohonu Bridge Replacement,Hana, Maui
Job 01-13

Dear Mr. Pennaz:

Thank you very much for your comment letter dated January 21, 2003 regarding the subject project. Members of our staff will be contacting Mr. William Lennan of the Regulatory Branch to discuss the proposed project in greater detail, including requirements for a Department of the Army (DA) permit.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Mike Ishikawa

MI:yp

cc: Joe Krueger, Department of Public Works and Environmental Management
Robyn Loudermilk, Department of Planning

satolwaiohonu\doa.res

United States Department of the Interior

NATIONAL PARK SERVICE
Haleakala National Park
P.O. Box 369
Makawao, Maui, Hawaii 96768

IN REPLY REFER TO:

February 6, 2003

Mr. Michael W. Foley
Planning Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Maui, Hawai'i 96797

Dear Mr. Foley:

We have reviewed "Special Management Area Use Application, Waiohonu Bridge Replacement" and have the following comments:

In our April 20, 2002 letter, we asked that the Environmental Assessment fully analyze all methods available for bridge preservation and strengthening that don't require complete reconstruction. We enclosed a report by Fyfe Co on preserving a 75-year old historic Bridge, saving the government between $16 & $ 26 million.

The analysis of the rehabilitation alternative on pages 50-51 is woefully inadequate. It states "The advantage of rehabilitating the bridge are that the construction costs may be slightly lower than building a new bridge, the appearance of the piers and abutment would be preserved, and the construction time may be slightly shorter. The disadvantages of rehabilitating the bridge would be that the County of Maui's cost will be higher because Federal participation would be limited..."

We need to know the rehabilitation techniques analyzed for this conclusion; specifically how much lower the cost would be; and how much less time and inconvenience to motorists the project would entail. We need to know how much less the Federal participation would be for rehabilitation including a corroborating statement from the U. S. Department of Transportation. If such information has not been compiled and examined, we can only conclude that a forthright, serious analysis has not been done.

On page 57, under "1. No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resource Would Occur as a Result of the Proposed Project," nowhere does it state that a cultural resource listed on the National Register of Historic Places will be destroyed. You must state that a significant cultural resource will be irrevocably lost as a result of the project. Thank you for the opportunity to comment.

Sincerely,

Donald W Reeser

Donald W. Reeser
Superintendent

cc:
U.S. Department of Transportation, Federal Highway Administration
State of Hawai'i, Historic Preservation Division
Mayor Alan Arakawa
Alliance for the Heritage of East Maui

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

February 24, 2003

Donald W. Reeser, Superintendent
United States Department of the Interior
National Park Service
Haleakala National Park
P.O. Box 369
Makawao, Hawaii 96768

Subject: Waiohonu Bridge Replacement, Hana, Maui

Dear Mr. Reeser:

We have received a copy of your February 6, 2003 letter to the Maui Planning Department offering your comments on the subject action. We appreciate your comments and offer the following information to clarify the basis for project design.

As indicated in the project description section of the Draft Environmental Assessment, the hydraulic capacity of the bridge is insufficient to carry the 100 year 24 hour storm. As a result, overtopping of the bridge occurs, creating instances where public health and welfare is seriously compromised. Inasmuch as the County of Maui is seeking to address this limitation, the reconstruction alternative was deemed superior from a hydraulic design standpoint. The new bridge will be designed to withstand the flood water forces and would reduce the number of supporting piers to increase the capacity through this crossing.

The rehabilitation alternative was examined by our structural engineers as well, including the use of products equivalent to Fibrwrap, which you called to our attention. However, based on the extent of structural deterioration to the railings, bridge deck, piers and attached structural members, the structural integrity of the bridge cannot be restored in a feasible manner to design standards using available restoration technologies.

Although cost was acknowledged as a consideration, non-cost factors such as those described above, including potential liability concerns related to flooding and structural integrity, were also considered as part of the overall design alternative assessment process.

As noted in the SMA application, reconstruction mitigation will include compliance with the Approved Final Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District. Further, a memorandum of agreement (pursuant to the National Historic Preservation Act) between the Federal Highway Administration and the State Historic Preservation Division will be executed to ensure strict compliance with agreed upon stipulations.

Thank you again for your participation in the review of this project.

Sincerely,

SATO & ASSOCIATES, INC.

Mike Ishikawa

MI:yp

cc: Joe Krueger, Department of Public Works and Environmental Management
Robyn Loudermilk, Department of Planning

sato\waiohonu\nps.res

...GLE
...MIN J. CAYETANO
GOVERNOR

ANTHONY J.H. CHING
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

January 8, 2003

Mr. Michael W. Foley, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Foley:

Subject: SM1 2002/0025
TMK: (2) 1-4-012:019
Project Name: Waiohonu Bridge Replacement
Applicant: Department of Public Works & Environmental Management

We acknowledge receipt of your January 3, 2003 transmittal regarding the above subject application.

Given the location, scope, and nature of the proposed activity, the State Land Use Commission defers to the judgment of the County of Maui in this matter. We have no further comments to offer at this time.

Thank you for the opportunity to comment on the subject project. Please feel free to contact me at 587-3822 should you require clarification or any further assistance.

Sincerely,

ANTHONY J.H. CHING
Executive Officer

RODNEY K HARAGA
DIRECTOR

GLENN M OKIMOTO
ACTING DEPUTY
DIRECTOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO

STP 8.0612

January 16, 2003

Mr. John E. Min
Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Waiohonu Bridge Replacement
Special Management Area Use Permit Application (SM1 2002/0025)
TMK: (2) 1-4-012:019

Thank you for your transmittal requesting our review of the subject project.

The subject project to replace the existing bridge will not impact our State transportation facilities. The portion of the project along Hana Highway is under the jurisdiction of the County.

We appreciate the opportunity to provide comments.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
Telephone (808) 586-4185
Facsimile (808) 586-4186
Email: oeqc@health.state.hi.us

December 9,.2002

Mr. Joe Kruger
Dept. of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawai'i 96793

Mr. Abraham Wong, Administrator
Federal Highway Administration
U.S. Department of Transportation
Box 50206, 300 Ala Moana Boulevard
Honolulu, Hawai'i 96850

Mr. Loren Lau
Sato & Associates, Inc.
2115 Wells Street
Wailuku, Hawai'i 96793

Dear Messrs. Kruger, Wong and Sato:

The Office of Environmental Quality Control has reviewed the October 2002, draft environmental assessment under Chapter 343, Hawai'i Revised Statutes for Waiohonu Bridge Replacement in the judicial district of Hana and offers the following comments for your consideration and response. Comments on the National Environmental Policy Act (NEPA) aspects of the document are submitted pursuant to an earlier gubernatorial executive order designating the office as the state point of contact for all NEPA documents.

1. JOINT STATE NEPA/CHAPTER 343, HRS DOCUMENT: We understand that this document is being submitted to fulfill both Federal and State environmental disclosure requirements. In the case of state law, it is clear that the County of Maui anticipates issuing a finding of no-significant impact. Please disclose whether the Federal Highway Administration anticipates a similar determination, or whether it intends to issue a categorical exemption for this project.
2. TEMPORARY DETOUR BRIDGE: Per page 9 of the draft environmental assessment, we understand a pre-engineered, pre-manufactured modular bridge using standardized pre-fabricated components will be delivered to the site in 20 and 40 foot containers. Please discuss the costs and traffic impacts of delivering these containers to the project site by barge to Hana Harbor and truck to project site, and solely by truck on the Hana Highway from Kahului Harbor.
3. WAIOHONU STREAM: Per page 18 of the draft environmental assessment, we understand that Waiohonu Stream is intermittent, flowing only after periods of heavy rains. Within its watershed area, please check with the State Commission on Water Resources Management whether the source of the stream flows perennially with the stream disappearing underground in the lower elevations, or whether the source of the stream itself is intermittent.
4. SUSTAINABLE BUILDING GUIDELINES, USE OF NATIVE PLANTS, AND GLASSPHALT. We respectfully refer you to our website at http://www.state.hi.us/health/oeqc/index.html for guidance documents on sustainable building and the use of native plants in landscaping. Also, please plan to use glassphalt aggregate for proposed paving at the project site.

Thank you for the opportunity to comment. If there are any questions, please call Leslie Segundo of my staff at (808) 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

February 20, 2003

Genevieve Salmonson, Director
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Proposed Waiohonu Bridge Replacement, Hana, Maui
Job 01-13

Dear Ms. Salmonson:

Thank you very much for your comment letter dated December 9, 2002 regarding the subject project. In response to the comments provided, we would like to note the following.

1. The final environmental assessment will indicate the Federal Highway Administration's intention to issue a finding of no significant impacts (FONSI) for the proposed project.

2. Structural engineers from the State of Hawaii Department of Land and Natural Resources have recently designated the pier at Hana Harbor as structurally unsound, and are in the process of condemning the structure. As such, the use of the pier for delivery of the temporary bridge structure and other building materials was not considered as a viable alternative.

   The temporary bridge structure will be delivered to the project site in approximately eighteen (18) twenty foot containers, less than ten (10) tons in weight. Preliminary cost estimates for trucking the containers from Kahului Harbor to the project site are estimated at approximately $10,800.00. Delivery of the containers would be completed by a local trucking company, delivered to the site during the middle of the night in order to minimize potential impacts to local traffic patterns.

3. Upon review of the State Commission on Water Resources Management's (CWRM) Hawaii Stream Assessment, and consultations with CWRM staff, it was determined that the Waiohonu Stream flows year-round in the upper portions and intermittently at lower elevations. The determination was also confirmed by a stream survey completed for the subject project, which indicated the Waiohonu stream flows intermittently in the vicinity of the project site.

4. To the extent practicable, the County of Maui will utilize sustainable building guidelines, use of native plants and glassphalt during construction of the subject project.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9625.

Sincerely,

SATO & ASSOCIATES, INC.

Mike Ishikawa

MI:yp

cc: Joe Krueger, Department of Public Works and Environmental Management
Robyn Loudermilk, Department of Planning

satolwalohonu\oeqc.res

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M. D.
DIRECTOR OF HEALTH

LORRIN W. PANG, M.D.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET, ROOM 301
WAILUKU, MAUI, HAWAII 96793-2198

January 21, 2003

Mr. Michael W. Foley
Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawai'i 96793

Attention: Robyn L. Loudermilk

Dear Mr. Foley:

Subject: **Waiohonu Bridge Replacement**
TMK: (2) 1-4-012:019
SM1 2002/0025

Thank you for the opportunity to comment on the Special Management Area Permit application. The concerns of the Department of Health are expressed in the May 3, 2002, letter from Gary Gill to Clyde Morimoto of Sato & Associates, Inc.

Should you have any questions, please call me at 984-8230.

Sincerely,

Herbert S. Matsubayashi
District Environmental Health Program Chief

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
Comptroller

KATHERINE H. THOMASON
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING
AND GENERAL SERVICES
SURVEY DIVISION
P.O. BOX 119
HONOLULU, HAWAII 96810-0119

'03 FEB -5 P1:30

February 3, 2003

MEMORANDUM

TO: Michael W. Foley, Planning Director
Maui County Planning Department

ATTN: Robyn L. Loudermilk, Staff Planner

FROM: Randall M. Hashimoto, State Land Surveyor
DAGS, Survey Division

SUBJECT: I.D.: SM1 2002/0025
TMK: (2) 1-4-012:019
Project Name: Waiohonu Bridge Replacement
Applicant: Dept. of Public Works & Environmental Management

The subject proposal has been reviewed and confirmed that no Government Survey Triangulation Stations or Benchmarks are affected. Survey has no objections to the proposed project.

LINDA LINGLE
GOVERNOR

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

ERNEST LAU
DEPUTY DIRECTOR

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

P.O. Box 621
HONOLULU, HAWAII 96809

February 4, 2003

L-377/144/242/209/454/427

SM12002-0025/LD-NAV

Honorable Michael W. Foley
Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Foley:

Subject: Application: Special Management Area Use Permit
File No.: SM1 2002-0025
Project: Waiohonu Bridge Replacement
Applicant: Department of Public Works & Environmental Management (COM)
Authority: County of Maui Department of Planning
TMK: 2nd/1-4-012: 019

Thank you for the opportunity to review and comment on the subject matter.

The Department of Land and Natural Resources' (DLNR) Land Division made available or distributed the one (1) copy of the document covering the subject matter to the following DLNR Divisions for their review and comment:

- Division of Aquatic Resources
- Division of Forestry and Wildlife
- Division of State Parks
- Division of Boating and Ocean Recreation
- Engineering Division
- Commission on Water Resource Management
- Land Division Planning and Technical Services
- Land Division Maui District Land Office

Attached herewith is a copy of the Commission on Water Resource Management, Engineering Division and Division of Aquatic Resources' comment.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter. Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 1-808-587-0384.

Very truly yours,

DIERDRE S. MAMIYA
Administrator

C: MDLO

LINDA LINGLE
GOVERNOR

DIVISION OF AQUATIC RESOURCES

DIR. STAFF	✓	Suspense Date:
CONSERVATION		Draft Reply ☐
AGRICULTURE		Reply Direct ☐
AQUACULTURE	✓	Comments ☐
STATE PARKS		Information ☐
FISH. DEV.		Comp Act & File ☐
STATISTICS		Return to:
AFRC		Copies to:
EDUCATION		Remarks
SEA GRANT		
OTHER		
FILE	02-16a	
PG	✓	

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. Box 621
HONOLULU, HAWAII 96809

ERIC T. HIRANO
ACTING CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

2003 JAN 21 A 11:30

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

January 7, 2003
LD/NAV
Ref.: SM12002-0025.CMT

Suspense Date: 1/27/03

MEMORANDUM:

TO: √**XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
**XXX Engineering Division
**XXX Division of State Parks
**XXX Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management (DD)
**XXX Land - Planning and Technical Services
XXX Land - Maui District Land Office (Received Directly)

FROM: Charlene E. Unoki: Acting Assistant Administrator
Land Division

RECEIVED
JAN 8 2003
AQUATIC RESOURCES

REQUEST: Application: Special Management Area Use Permit
I.D. No.: SM1 2002/0025 - TMK: 2nd/ 1-4-012: 019
Name: Waiohonu Bridge Replacement
Applicant: Department of Public Works & Environmental Management
Authority: County of Maui Department of Planning

Please review the attached document covering the subject matter and submit your comments (if any) on Division letterhead signed and dated within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0384.

**Note: One copy of the document is available for your review in the Land Division Office, Room 220.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments. (√) Comments attached.

Date: 1/29/2003

Signed:

Name: WILLIAM S. DEVICK, Administrator

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON

MEREDITH J. CHING
CLAYTON W. DELA CRUZ
CHIYOME L. FUKINO, M.D.
BRIAN C. NISHIDA
HERBERT M. RICHARDS, JR.

DEAN NAKANO
ACTING DEPUTY DIRECTOR

RECEIVED
2003 JAN 16 P 4:15

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

Jaunary 15, 2003

Ref:SM12002-0025.CMT

TO: Ms. Dierdre S. Mamiya, Administrator
Land Division

FROM: Dean A. Nakano, Acting Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Special Management Area Use Permit, County of Maui, Department of Public Works
TMK: 1-4-012:019, Papaahawahawa Bridge Replacement

FILE NO.: SM12002/0025

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[ ] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[ ] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[X] OTHER:

The applicant acknowledges the need for a stream channel alteration permit (page 56).

If there are any questions, please contact David Higa at 587-0249.

LINDA LINGLE
GOVERNOR

ERIC T. HIRANO
ACTING CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. Box 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

RECEIVED
JAN 9 P 3:00
COMMISSION ON WATER RESOURCE MANAGEMENT

January 7, 2003
LD/NAV
Ref.: SM12002-0025.CMT

Suspense Date: 1/27/03

MEMORANDUM:

TO: **XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
**XXX Engineering Division
**XXX Division of State Parks
**XXX Division of Boating and Ocean Recreation
✓ XXX Commission on Water Resource Management (DD)
**XXX Land - Planning and Technical Services
XXX Land - Maui District Land Office (Received Directly)

FROM: Charlene E. Unoki: Acting Assistant Administrator
Land Division Charlene

SUBJECT: Application: Special Management Area Use Permit
I.D. No.: SM1 2002/0025 - TMK: 2nd/ 1-4-012: 019
Name: Waiohonu Bridge Replacement
Applicant: Department of Public Works & Environmental Management
Authority: County of Maui Department of Planning

Please review the attached document covering the subject matter and submit your comments (if any) on Division letterhead signed and dated within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0384.

****Note: One copy of the document is available for your review in the Land Division Office, Room 220.**

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments. (✓) Comments attached.

Date: _____

Signed: _____

Name: _____

LINDA LINGLE
GOVERNOR

2003 JAN 21 A 9:32

RECEIVED
DIVISION OF
LAND MANAGEMENT
2003 JAN -9 PM 2:03

ERIC T. HIRANO
ACTING CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

LAND DIVISION

P.O. Box 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

January 7, 2003
LD/NAV
Ref.: SM12002-0025.CMT

Suspense Date: 1/27/03

MEMORANDUM:

TO: **XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
**XXX Engineering Division
**XXX Division of State Parks
**XXX Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management (DD)
**XXX Land - Planning and Technical Services
√ XXX Land - Maui District Land Office (Received Directly)

FROM: Charlene E. Unoki: Acting Assistant Administrator
Land Division Charlene

SUBJECT: Application: Special Management Area Use Permit
I.D. No.: SM1 2002/0025 - TMK: 2nd/ 1-4-012: 019
Name: Waiohonu Bridge Replacement
Applicant: Department of Public Works & Environmental Management
Authority: County of Maui Department of Planning

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**Note: One copy of the document is available for your review in the Land Division Office, Room 220.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

(√) We have no comments. ( ) Comments attached.

Date: 1-17-03

Signed: Jason K. Koga

Name: Jason K. Koga

LINDA LINGLE
GOVERNOR

ERIC T. HIRANO
ACTING CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. Box 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
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CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

January 7, 2003
LD/NAV
Ref.: SM12002-0025.CMT

Suspense Date: 1/27/03

MEMORANDUM:

TO: √**XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
**XXX Engineering Division
**XXX Division of State Parks
**XXX Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management (DD)
**XXX Land - Planning and Technical Services
XXX Land - Maui District Land Office (Received Directly)

FROM: Charlene E. Unoki: Acting Assistant Administrator
Land Division

SUBJECT: Application: Special Management Area Use Permit
I.D. No.: SM1 2002/0025 - TMK: 2nd/ 1-4-012: 019
Name: Waiohonu Bridge Replacement
Applicant: Department of Public Works & Environmental Management
Authority: County of Maui Department of Planning

Please review the attached document covering the subject matter and submit your comments (if any) on Division letterhead signed and dated within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0384.

****Note: One copy of the document is available for your review in the Land Division Office, Room 220.**

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

(X) We have no comments.

( ) Comments attached.

Date: JAN - 9 2003

Signed:

Name: MICHAEL G. BUCK, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE

REF.: SM12002-0025.CMT

State of Hawaii
Department of Land and Natural Resources
DIVISION OF AQUATIC RESOURCES
January 27, 2003

MEMORANDUM

To: Charlene E. Unoki, Acting Assistant Administrator
Land Division
From: William Devick, Administrator WD
Division of Aquatic Resources
Subject: Comments on __x__ Special Management Area Use Permit

Summary of Project

Title: Waiohonu Bridge Replacement
Proj. By: Department of Public Works & Environmental Planning
Location: Waiohonu Stream, Hana, Maui, Hawaii

Brief Description:

The County of Maui, Department of Public Works and Waste Management, proposes to: 1) replace the existing Waiohonu concrete bridge; 2) adjust the roadway alignment at the approaches to the bridge; resurface the roadway, and; install guardrails at the approaches to the bridge.

Waiohonu Bridge is a substandard 16-foot wide single-lane roadway which accomodates two-way traffic. There are currently no guardrails at the approaches to the bridge. Built in 1915, the structure consists of a narrow, 17-foot single lane deck, 30-inch vertical balusters, and concrete railing caps. The bridge is supported by reinforced concrete tee-beams running parallel to the roadway, supported by one concrete rubble masonary (CRM) pier support and three concrete piers, varying in heights between 13 feet and 16 feet.

Given the structural deficiencies of the Waiohonu Bridge, the applicant proposes bridge reconstruction which will preserve its unique design features, while providing a structurally safe passage. The new bridge will retain the single lane design, and will be approximately 18-feet wide and 97 feet long. In addition, the undercarriage of the bridge will be reconstructed, and supported by two concrete center piers.

The proposed action will not involve diversion of waters during and after construction. Best management practices will be employed during construction to minimize soil erosion into downstream areas and the nearshore ocean environment.

REF.: SM12002-0025.CMT

Comments:

The applicant should implement the BMPs described in the project proposal to mitigate adverse impacts to aquatic life in Waiohonu Stream and adjacent coastal waters.

LINDA LINGLE
GOVERNOR

ADMINISTRATOR
ASST ADMIN
BR
BR
BR
ASST
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RM
REC
SUPV
BR
STORES
FILE
SEND COPY TO

ERIC T. HIRANO
ACTING CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

P.O. Box 621
HONOLULU, HAWAII 96809

January 7, 2003
LD/NAV
Ref.: SM12002-0025.CMT

Suspense Date: 1/27/03

MEMORANDUM:

TO: **XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
√ **XXX Engineering Division
**XXX Division of State Parks
**XXX Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management (DD)
**XXX Land - Planning and Technical Services
XXX Land - Maui District Land Office (Received Directly)

FROM: Charlene E. Unoki: Acting Assistant Administrator
Land Division Charlene

SUBJECT: Application: Special Management Area Use Permit
I.D. No.: SM1 2002/0025 - TMK: 2nd/ 1-4-012: 019
Name: Waiohonu Bridge Replacement
Applicant: Department of Public Works & Environmental Management
Authority: County of Maui Department of Planning

Please review the attached document covering the subject matter and submit your comments (if any) on Division letterhead signed and dated within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0384.

**Note: One copy of the document is available for your review in the Land Division Office, Room 220.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

(√) We have no comments. ( ) Comments attached.

Date: JAN. 28 2003

Signed: [signature]

Name: Daniel S. Quinn

LINDA LINGLE
GOVERNOR

ERIC T. HIRANO
ACTING CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

P.O. Box 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

'03 JAN 08 P04:31 ENGINEERING

January 7, 2003
LD/NAV
Ref.: SM12002-0025.CMT

Suspense Date: 1/27/03

MEMORANDUM:

TO:
- **XXX Division of Aquatic Resources
- **XXX Division of Forestry & Wildlife
- **XXX Engineering Division
- **XXX Division of State Parks
- **XXX Division of Boating and Ocean Recreation
- XXX Commission on Water Resource Management (DD)
- **XXX Land - Planning and Technical Services
- XXX Land - Maui District Land Office (Received Directly)

FROM: Charlene E. Unoki: Acting Assistant Administrator
Land Division

SUBJECT:
- Application: Special Management Area Use Permit
- I.D. No.: SM1 2002/0025 - TMK: 2nd/ 1-4-012: 019
- Name: Waiohonu Bridge Replacement
- Applicant: Department of Public Works & Environmental Management
- Authority: County of Maui Department of Planning

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****Note: One copy of the document is available for your review in the Land Division Office, Room 220.**

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Date: _____

Signed: _____

Name: _____

DEPARTMENT OF LAND AND NATURAL RESOURCES
Engineering Division

COMMENTS

We have previously reviewed the pre-consultation letter for the subject project, and have the following additional comment:

Because the proposed project site is located in Zone A, the National Flood Insurance Program regulates development within Zone A as set forth in Title 44 of the Code of Federal Regulations § 60.3 (b).

Signed: Andrew M. Monden
For ERIC T. HIRANO, CHIEF ENGINEER

Date: 1/27/03

Sato & Associates, Inc.

Consulting Engineers

2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI

Tel: (808) 244-9265
Fax:(808) 244-5303

February 21, 2003

Dierdre S. Mamiya, Administrator
Department of Land and
Natural Resources
Land Division
P.O. Box 621
Honolulu, Hawaii 96809

Subject: Proposed Waiohonu Bridge Replacement, Hana, Maui
Job 01-13

Dear Ms. Mamiya:

Thank you very much for your comment letter dated February 4, 2003 regarding the subject project. In response to the comments provided, we would like to note the following.

1. The Department of Public Works and Environmental Management (DPWEM) will process a Stream Channel Alteration Permit with the office of the Commission on Water Resource Management.

2. Appropriate BMPs will be utilized during project construction to mitigate potential adverse impacts to aquatic life in Waiohonu Stream and adjacent waters.

3. The DPWEM acknowledges that the project site is located within Zone A, and will be constructed in compliance with all applicable requirements of the National Flood Insurance Program.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Mike Ishikawa

MI:yp

cc: Joe Krueger, Department of Public Works and Environmental Management
Robyn Loudermilk, Department of Planning

sato\waiohonu\dlnr.res

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LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEME

DEPUTY
ERNEST Y. W. LAU

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

February 5, 2003

Mr. Michael Foley, Planning Director
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

LOG NO: 31647
DOC NO: 0302CD01

Dear Mr. Foley:

SUBJECT: National Historic Preservation Act Section 106 Review and Chapter 6E-42 Historic Preservation Review - Special Management Area Use Permit Application for the Proposed Waiohonu Bridge Replacement Project (SUBJECT I.D.: SM1 2002/0025) [County/Planning]
Maka`alae and Waiohonu Ahupua`a, Hana District, Island of Maui
TMK: (2) 1-4-012:019

Thank you for the opportunity to respond and comment on the Special Management Area Use Permit Application for the Proposed Waiohonu Bridge Replacement Project, which was received by our staff 7 January 2003. We have previously provided archaeological comments pertaining to the proposed undertaking (SHPD DOC NO.: 0206CD29/LOG NO.: 30100) which we restate below.

Our records indicate that a field inspection was conducted of the subject parcel on Tuesday July 3, 2001, by Patty Jo Conte, previously of our Hawaiian Homelands Program. Based on the results of the field inspection and a recent telephone conversation, between Ms. Conte and Cathleen Dagher, SHPD Assistant Maui/Lana`i Island Archaeologist, we understand the sites mentioned in our previous correspondence (State Site 50-50-13-1082, the Waiohonu Pictographs, located mauka of the proposed undertaking in Waiohonu Gulch, and Site 50-50-13-4006, a habitation complex located on the makai side of the proposed undertaking) are not in close proximity to the proposed project area. Therefore, we believe there will be no adverse effect to archaeological sites.

However, we are still awaiting the completion of the Section 106 consultation process for the bridge, which will require the preparation of a Memorandum of Agreement. Staff has provided a sample Memorandum of Agreement (MOA) to the Public Works Division. We look forward to continued consultation on this project with FHWA. We also hope the Counties, the State Department of Transportation and FHWA can

continue the work on the Programmatic Agreement that was done earlier so that an MOA is not necessary for each and every project involving the replacement of a bridge over 50 years old. Should you have further questions regarding the MOA, please call Tonia Moy at (808)692-8030.

If you have any questions, please call Cathleen A. Dagher at 692-8023.

Aloha,

Cathy Dagher
Assistant Archaeologist, Maui Island

P. Holly McEldowney, Acting Administrator
State Historic Preservation Office

CD:jk

c: ✓ Joe Kruger, County of Maui
Abraham Wong, FHWA

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

February 21, 2003

Holly McEldowney, Acting Administrator
State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Subject: Proposed Waiohonu Bridge Replacement; Job 01-13

Dear Ms. McEldowney:

Thank you for your comment letter dated February 5, 2003 regarding the subject project. In response to the comments provided, we would like to note the following.

The County of Maui Department of Public Works and Environmental Management (DPWEM) and the Federal Highways Administration (FHWA) are working with various interested parties towards the drafting of a Memorandum of Agreement for the subject project.

Further, as appropriate, the DPWEM will work with the State Department of Transportation and the FHWA regarding the formulation of a Programmatic Agreement to address necessary bridge repairs along the Hana Highway.

We look forward to your continued assistance throughout this project. Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Mike Ishikawa

MI:yp

cc: Joe Krueger, Department of Public Works and Environmental Management
Robyn Loudermilk, Department of Planning

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RECEIVED
COUNTY OF MAUI

2003 JAN 30 P 3:25

ENGINEERING DIVISION
DEPT. OF PUBLIC WORKS

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 270-7816 • Fax (808) 270-7833

January 27, 2003

Mr. Michael W. Foley, Director
Planning Department,
County of Maui
250 South High Street
Wailuku HI 96793

Dear Mr. Foley:

SUBJECT: Project Name: Waiohonu Bridge Replacement, Hana
TMK: (2) 1-4-012:019
ID : SM12002/0025

Thank you for the opportunity to comment on this project proposal.

There is an existing 4-inch water line suspended from the Waiohonu bridge. The applicant, in coordination with our Engineering Division, had designed a plan for the relocation of this line as well as its appurtenances. Upgrade of the existing 4-inch line to an 8-inch is likewise integrated in the project design.

This project is located within a portion of our Hamoa-Koali waterline project scheduled for design in 2004. The applicant should coordinate with our Engineering and Planning Divisions regarding schedule and alternative water service arrangements in order to minimize water disruption in the service area during construction.

We are pleased to note the integration of best management practices (BMPs) geared toward the prevention of soil erosion into downstream areas and nearshore ocean environment in the Best Management Practice Plan portion of the Draft EIS.

Should you have any questions, please contact our Water Resources and Planning Division at 270-7199.

Sincerely,

George Y. Tengan
Acting Director

eam
c: engineering division

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

February 20, 2003

George Tengan, Director
County of Maui
Department of Water Supply
P.O. Box 1109
Wailuku, Hawaii 96793

Subject: Proposed Waiohonu Bridge Replacement, Hana, Maui
Job 01-13

Dear Mr. Tengan:

Thank you very much for your comment letter of January 27, 2003 regarding the subject project. In response to the comments provided, we would like to note the following.

Project engineers will coordinate with the Department's Engineering Division to establish a design which will minimize water service down time for residents in the vicinity of the project area.

In addition, we would like to note that the Department of Water Supply has agreed to pay for the costs associated with increasing the size of water pipes beneath the bridge structure.

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Mike Ishikawa

MI:yp

cc: Joe Krueger, Department of Public Works and Environmental Management
Robyn Loudermilk, Department of Planning

sato\waiohonu\dws.res

J. ARAKAWA
Mayor

ERT S. COLOMA-AGARAN
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

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

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND ENVIRONMENTAL MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

TRACY TAKAMINE, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

JOHN D. HARDER
Solid Waste Division

January 23, 2003

03 JAN 30 P3:03

MEMO TO: MICHAEL W. FOLEY, PLANNING DIRECTOR

FROM: for GILBERT S. COLOMA-AGARAN, DIRECTOR OF PUBLIC WORKS AND ENVIRONMENTAL MANAGEMENT

SUBJECT: SPECIAL MANAGEMENT AREA PERMIT APPLICATION
WAIOHONU BRIDGE REPLACEMENT
TMK: (2) 1-4-012:019
SM1 2002/0025

We reviewed the subject application and have the following comments:

1. Include a plan for bridge demolition waste.

2. The subject project shall comply with the provisions of the grading ordinance and provide and maintain best management practices to the maximum extent practicable to prevent pollutants including dust and sediment from discharging off the project site.

If you have any questions regarding this memorandum, please call Milton Arakawa at Ext. 7845.

RMN:msc
S:\LUCA\CZM\waiohunabridge-sma.wpd

Sato & Associates, Inc.
Consulting Engineers
2115 Wells Street, Maui, Hawaii 96793
OFFICES IN HONOLULU AND MAUI
Tel: (808) 244-9265
Fax:(808) 244-5303

February 20, 2003

Gilbert Coloma-Agaran, Director
County of Maui
Department of Public Works
and Environmental Management
200 South High Street
Wailuku Hawaii 96793

SUBJECT: Proposed Waiohonu Bridge Replacement, Hana, Maui
Job 01-13

Dear Mr. Coloma-Agaran:

Thank you very much for your comment letter dated January 23, 2003 regarding the subject project. In response to the comments provided, we would like to note the following.

1. Prior to any construction activities, a solid waste management plan for the proposed project will be submitted to your office for review and approval; and

2. The proposed project will comply with the provisions of the Maui County grading ordinance. Further, a best management practices plan has been developed for the proposed project, attached for your reference as Exhibit "A".

Should you have any questions or require additional information, please do not hesitate to call me at 244-9265.

Sincerely,

SATO & ASSOCIATES, INC.

Mike Ishikawa

MI:yp

cc: Joe Krueger, Department of Public Works and Environmental Management
Robyn Loudermilk, Department of Planning

sato\waiohonu\dpwem.res

XIV. REFERENCES

County of Maui Planning Department, *Hana Community Plan of the County of Maui, July 1984.*

County of Maui Planning Department, *Maui County Community Plan Update Program: Socio-Economic Forecast, Phase 1 Report (Pre-Final Version), May 2002.*

County of Maui, Department of Public Works and Environmental Management, *Application for Special Management Area Permit Kaholopo Bridge Replacement, August 2001. Replacement of Kaholopo Stream Bridge Design Exception, March 2001.*

County of Maui, Department of Public Works and Environmental Management, *Papaahawahawa Bridge Replacement Draft Environmental Assessment, December 1995.*

Federal Emergency Management Agency, *Flood Insurance Rate Map, Maui County, Hawaii, Community-Panel Number 15003-0385b, June 1, 1981.*

State of Hawaii Department of Business, Economic Development & Tourism Land Use Commission, *Land Use District Boundary Maps - Haiku Quadrangle, 1983.*

U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii,* in cooperation with the University of Hawaii, Agricultural Experiment Station, August 1972.

U.S. National Park Service Western Region Natural Resources and Research Division Hawaii Cooperative Park Service Unit, *Hawaii Stream Assessment - A Preliminary Appraisal of Hawaii's Stream Resources Report R84,* Prepared for the State of Hawaii Department of Land and Natural Resources Commission on Water Resource Management, December 1990.

Wilson Okamoto & Associates, Inc., *Final Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District,* prepared for County of Maui, Department of Public Works and Environmental Management, December 2001.

APPENDIX A

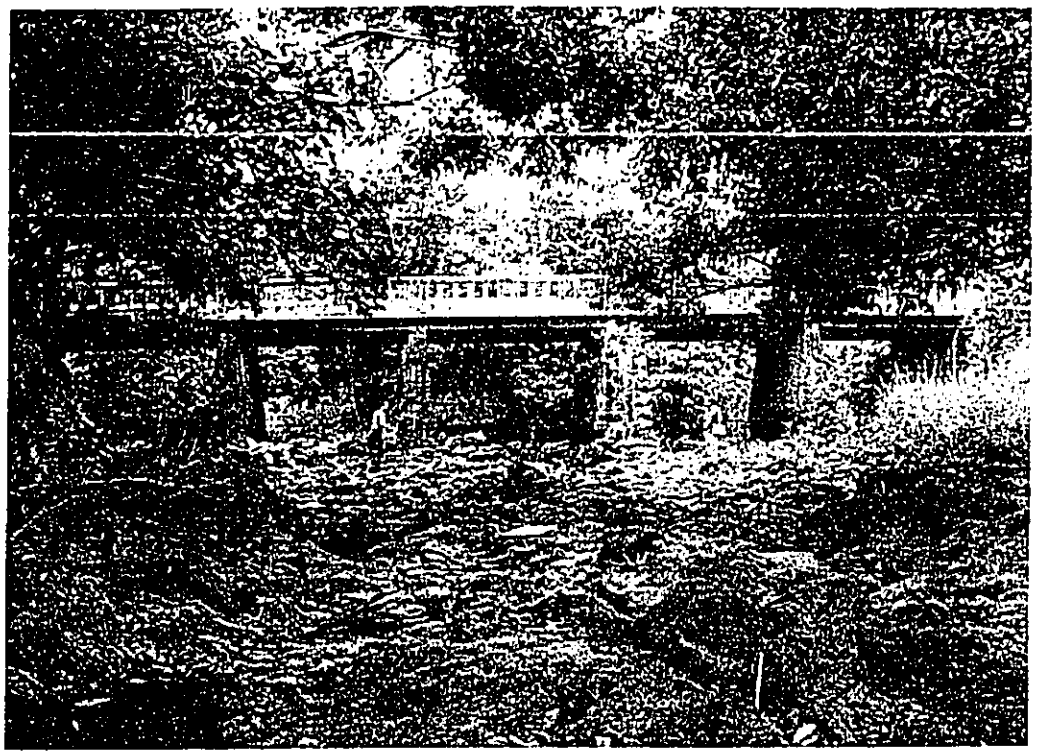
Site Photographs

County of Maui
Department of Public Works and Waste Management

August 2002

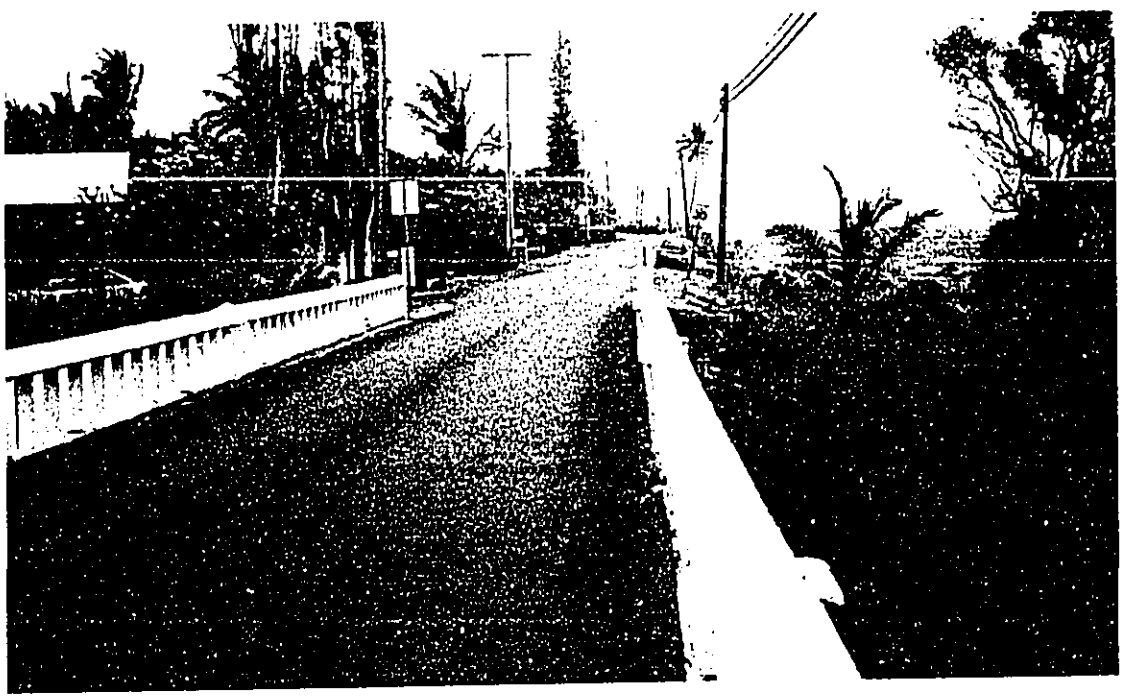
Photograph 1: View of Waiohonu Bridge looking north-east towards Hana

Photograph 2: View of Waiohonu Bridge looking south-west towards Kipahulu

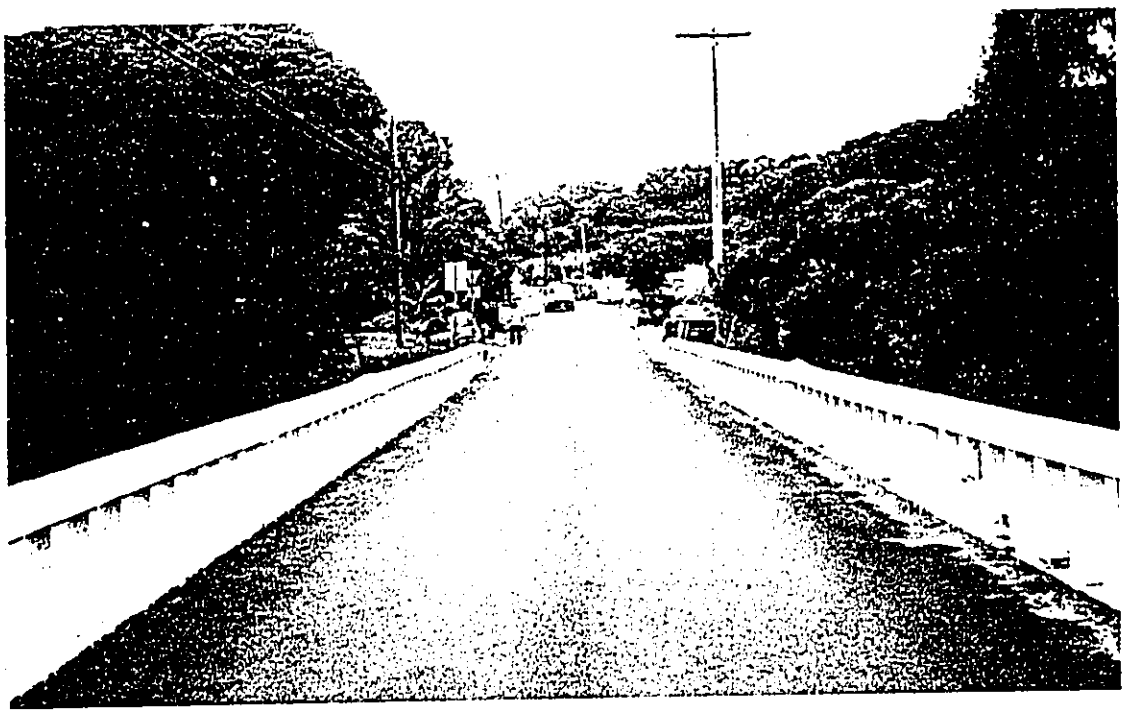


Photograph 3: View of Waiohonu Bridge looking north-west (upstream)

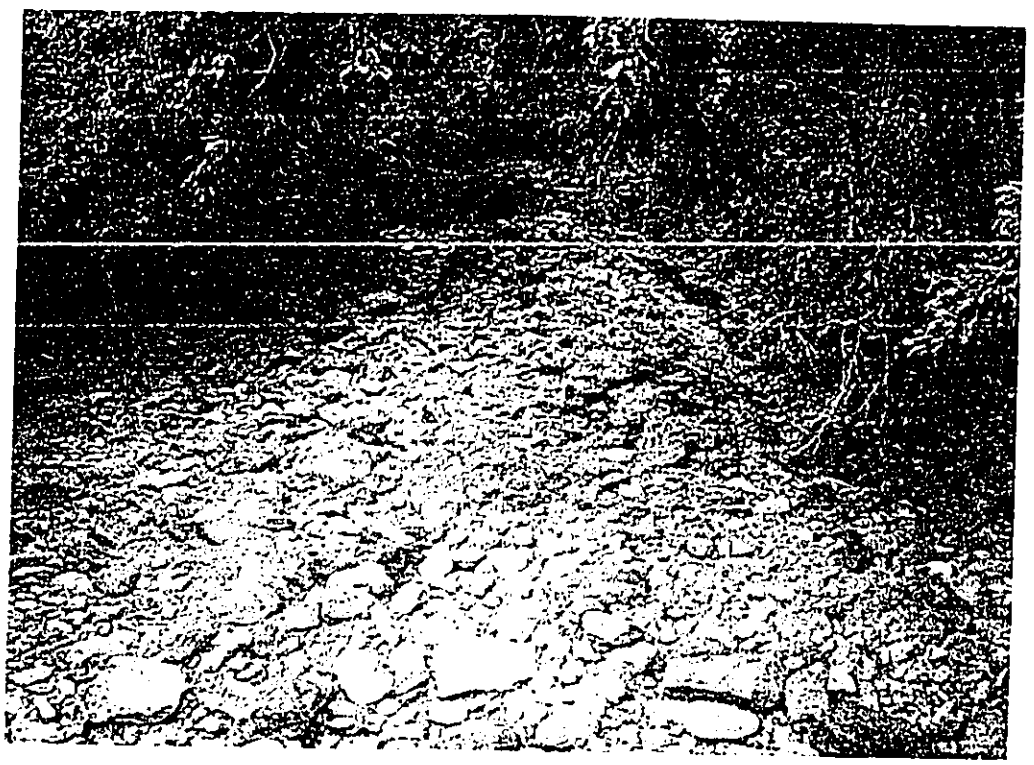
Photograph 4: View of Waiohonu Bridge looking south-east (downstream)



Photograph 5: View from Waiohonu Bridge looking north-east towards Hana

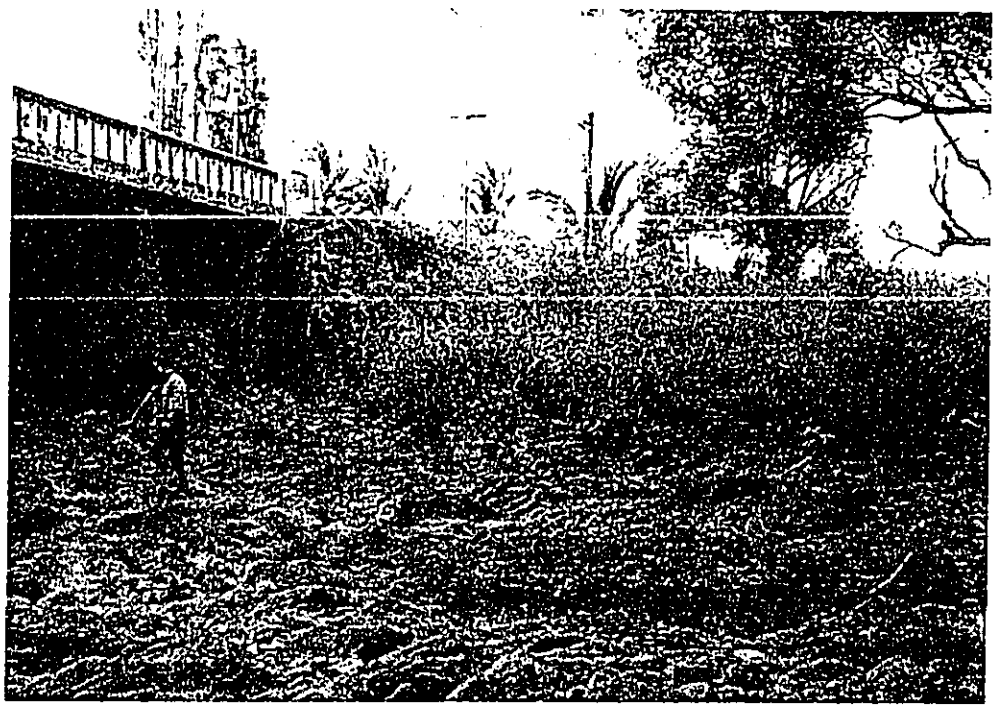


Photograph 6: View from Waiohonu Bridge looking south-west towards Kipahulu



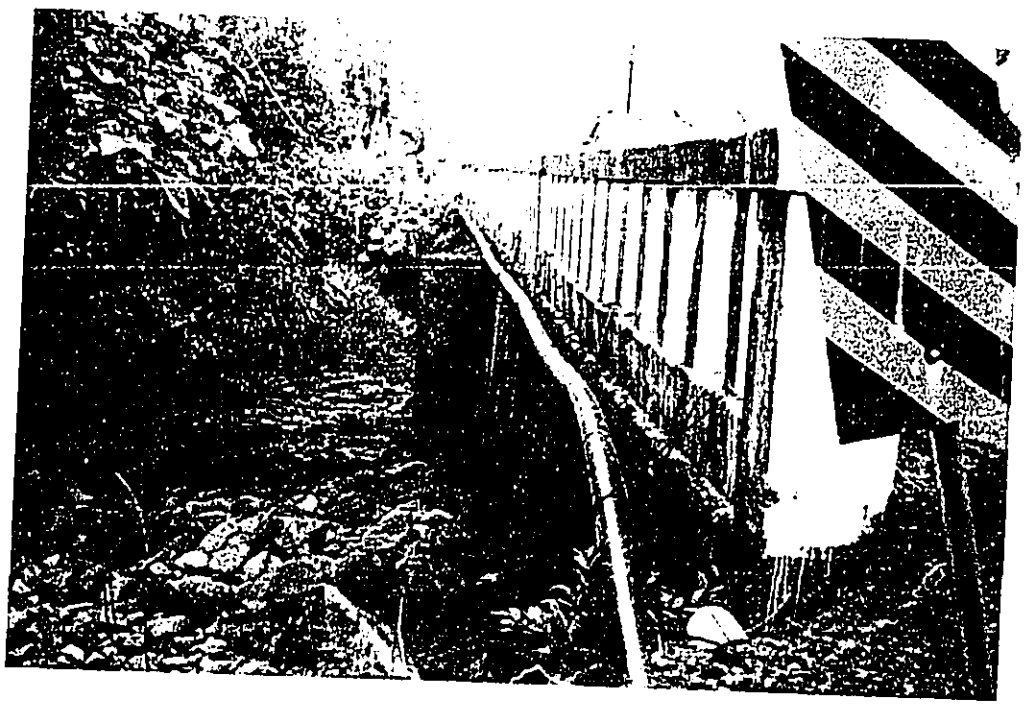
Photograph 7: View from Waiohonu Bridge looking north-west (upstream)

Photograph 8: View from Waiohonu Bridge looking south-east (downstream)



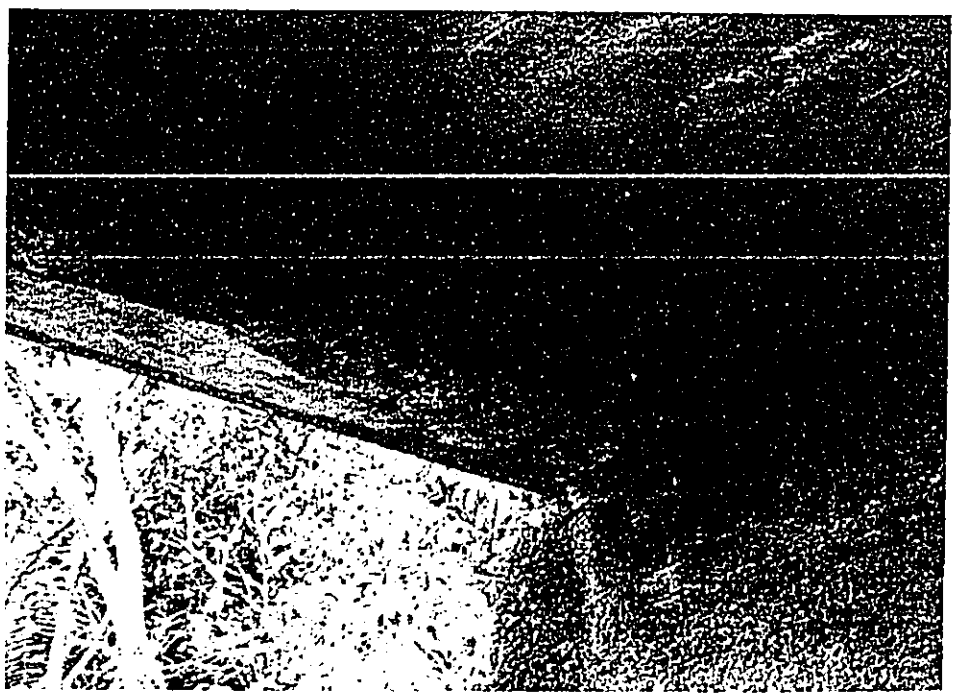
Photograph 9: View of the downstream side of
Waiohonu Bridge looking north-east towards Hana

Photograph 10: View of the downstream side of
Waiohonu Bridge looking south-west towards Kipahulu



Photograph 11: View of the upstream side of
Waiohonu Bridge looking north-east towards Hana

Photograph 12: View of the upstream side of
Waiohonu Bridge looking south-west towards Kipahulu



Photograph 13: View of existing bridge beam condition

Photograph 14: View of existing bridge beam condition

APPENDIX B

Bridge Inspection Report for
Waiohonu Bridge

County of Maui
Department of Public Works and Waste Management

August 2002

HAWAII DEPARTMENT OF TRANSPORTATION — STRUCTURAL INVENTORY AND APPRAISAL — DATE PRINTED: 09/12/2000

Structure Number: 009003600904803

(209) Str Name: WAIOHONU #29

Princ Rte: 360 Milepost: 0.000

Geographic and Route Data

(1)	State	Hawaii
(2)	District	20
(3)	County	Maui
(4)	Place	
(6)	Feature Under	WAIOHONU STRM #29
(7)	Facility on	HANA HWY
(9)	Location	0.90MI S/RD TO HAMOA
(16)	Latitude	20° 42' 30.00"
(17)	Longitude	155° 59' 54.00"
(98)	Border Bridge	
(99)	Border Brdige Str No	
(103)	Temportary Str	

On and Under Record Data

		Route On
(5)	Inventory Route	141000362
(10)	Min Vert Clr	99.99 M
(11)	Kilometerpoint	0077.295
(19)	Detour Length	199 km
(20)	Toll	3
(26)	Func Class	06
(28)	Lanes on/under	0100
(29)	ADT	775
(30)	Year of ADT	1998
(47)	Total Horz Clearance	04.7 M
(100)	Defense Hwy	0
(101)	Parallel Str	N
(102)	Direction of Traffic	3
(104)	Hwy System	0
(109)	Truck Traffic	00%
(110)	Natl Truck Network	No

General Data

(21)	Maintenance Responsibility	02
(22)	Owner	02
(31)	Design Load	2
(33)	Bridge Median	0
(34)	Skew	00 deg
(35)	Str Flared	No
(37)	Hist Significance	4
(38)	Navigation Control	0
(42)	Type of Service	15
(43)	Structure Type Main	102
(44)	Structure Type Approach	000
(45)	No of Span Main	005
(46)	No of Approach Spans	0000
(27)	Year Built	1915
(106)	Year Reconstructed	0000
(107)	Deck Str Type	1
(108)	Wear Surf/Protv Sys	609
(111)	Nav Pier/Abut Protection	

Dimensional Data

(32)	Approach Rdwy Width	4.9 M
(39)	Navigation Vert Clr	000.0 M
(40)	Navigation Horz clr	0000.0 M
(48)	Max Span Length	0006.1 M
(49)	Str Length	00029.6 M
(50)	Curb/Sidewalk Width	Left 00.0 M
		Right 00.0 M
(51)	Brg Rdwy Width,curb-curb	004.7 M
(52)	Deck Width out-out	005.1 M
(53)	Min Vert Clr over	99.99 M
(54)	Min Vert Clr under	N 00.00 M
(55)	Min Lat Underclr R	N 00.0 M
(56)	Min Lat Underclr L	99.9 M
(112)	NBIS Bridge Length	Y
(116)	Navigation Min Vert Clr	M

Proposed Improvements

(75)	Type of Work	
(76)	Improvement Length	000000 M
(94)	Bridge Improv Cost	0
(95)	Rdwy Improv Cost	0
(96)	Total Proj Cost	0
(97)	Year of Cost Est	
(114)	Future ADT	0
(115)	Year of Future ADT	

Condition Rating

(58)	Deck	5
(59)	Superstructure	3
(60)	Substructure	5
(61)	Channel & Channel Protect	7
(62)	Culverts	N

Appraisal Rating

(67)	Structure Evaluation	3
(68)	Deck Geometry	2
(69)	Underclrn Vert & Horz	N
(71)	Waterway Adequacy	8
(72)	Approach Rdwy Alignment	6
(36)	Traffic Safety Features	0000

Scour Data

(113)	Scour Critical Bridges	8
(202)	Foundation Type	
(220)	Foundation Embedment	0.0 M
(221)	Scour Countermeasures	

Load Rate and Post

(41)	Str Open/Post/Close	Posted
(64)	Operating Rating	16.1 ton
(66)	Inventory Rating	11.0 ton
(70)	Bridge Posting	0

Proposed Maintenance

(212)	Repair Priority	
(213)	Proposed Maint Type	
(215)	Maintn Date Completed	10/30/1998
(216)	Actual Maint Cost	0

Inspection Data

(90)	Inspection Date (MoYr)	0800
(91)	Inspection Frequency	12 Mo
(92)	Critical Feature Insp	(93)Date
	Frac Crit Insp : N	08/00
	Underwater Insp: N	/
	Other Spec Insp: Y 12	/
(207)	Inspection Quarter	4
(208)	Inspection Number	
(210)	Date of Inspection	08/31/2000

Over 200 Items

(200)	Princ Route Location	
(201)	Wear Surface Thickness	0.0 mm
(203)	District Maint Org	
(204)	Original Proj #	
(205)	Station Princ Rte	0.000
(206)	Bridge Rail Type	
(217)	Culvert Bbl Height	0.0 M
(218)	Culvert Bbl Length	0.0 M
(219)	Culvert Fill Height	0.0 M
(222)	Date of Load Rating	08/01/1980
(223)	Tracs No	
(224)	Bridge Crew Region	
(225)	Total Deck Area (M^2)	0.0
(226)	Superstr Unit Cost	0.00
(227)	Substr Unit Cost	0.00
(228)	Next Insp Due Date (QuartYr)	301
(229)	Agency	COUNTY OF MAUI
(230)	Principal Route Number	360
(231)	Principal Route Letter	
(232)	Principal Route Milepost	0.000
(300)	Comments:	

Sufficiency Rating = 011.0

Structurely Deficient

Hawaii Department of Transportation

PONTIS INSPECTION REPORT (HINBI97.DBF) Date: 09/12/2000

8. Structure # :009003600904803
209. Bridge Name :WAIOHONU #29
Inspector: NEWHOUSE/JH/MD
2/3. Dist/County :20/Maui

5. Route :141000362
36. Traffic Safety :0000
208. Inspection Number :
203. Dist. Maint ORG :
11. Milepost :0077295
113. Scour Critical :8
210. Inspection date :08/31/2000
228. Next Insp due Qtr :301
224. Bridge Crew Region :

Condition Item	Rating	Appraisal Item	Rating
58. Deck	:5	67. Stru Evaluation	:3
59. Superstructure	:3	68. Deck Geometry	:2
60. Substructure	:5	69. Underclearances	:N
61. Waterway	:7	71. Waterway Adequacy	:8
		72. Approach Alignment	:6

PONTIS BRIDGE ELEMENT DATA

Elem No.	Description	Env. Unit	Total Quan	Quan1	Quan2	Quan3	Quan4	Quan5
39	Concrete slab unprotected w/ac overlay	0 EA	1	0	1	0	0	0
110	Reinf.\ Concrete open girder	0 M	119	16	52	30	21	0
210	Reinf.\ Concrete pier wall	0 M	19	8	6	5	0	0
211	Masonry Pier Wall	0 M	6	0	6	0	0	0
215	Reinf.\ Concrete abutment	0 M	13	0	11	2	0	0
312	Enclosed/concealed bearing and/or seat	0 EA	4	4	0	0	0	0
331	Concrete bridge railing	0 M	59	0	47	10	2	0
359	Smart Flag - Deck Soffit	0 EA	1	0	0	1	0	0

------- Comments -------

This structure is in poor condition. A.C. wearing surface defects allow water to infiltrate concrete slab, leak thru joints, and onto pier caps, abutment seats, piers, and abutments. Girders are typically defected with spalls, reinforcing exposed, some stirrups are missing on these girders, which have rusted away over a period of time. The soffit is typically defected with water stains, efflorescence, and cracking, with new spalling iminent. This structure is a candidate for major rehabilitation or replacement. Vegetation growth around the structure is beginning to grow into the cracks, and crm. All defects have increased in severity, with moderate amounts of water leaking through from the soffit.

Hawaii Department of Transportation — 97 Structure Inspection Report

STRUCTURE NUMBER : 009003600904803
Inventory Route : 141000362
Reviewer : CARY YAMASHITA
209. Bridge Name :WAIOHONU #29

Date : 09/12/2000
Inspector : NEWHOUSE/JH/MD
Inspection date : 08/31/2000
2/3. Dist/County: 20/Maui

			Critical (Y/N)					
58 DECK	:5	59 SUPERSTRUCTURE	:3					
1. Wearing Surface	:6	1. Bearing Devices	:			11. Concrete Cracking	:3	N
2. Deck Stru Cond	:4	2. Stringers	:	Y		12. Collision Damage	:6	N
3. Curbs	:	3. Girder or Beams	:3	Y		13. Deflection w Load	:5	N
4. Median	:	4. Diaphragms or Floor Beams	:			14. Align of Member	:5	N
5. Sidewalks	:					15. Vibration	:5	N
6. Parapet	:5	5. Trusses- General	:	Y				
7. Railing	:	- Portals	:	Y				
8. Paint/Finish	:	-Bracing	:	Y				
9. Drains	:0	6. Paint/Finish	:	N				
10. Lighting Std	:	7. Rivets/Bolts	:	N				
11. Utilities	:6	8. Welds - Cracks	:	N				
12. Joint Leakage	:	9. Rust	:	N				
13. Exp Joint/Device	:	10. Timber Decay	:	N				

60 SUBSTRUCTURE	:5	60			61			
1. Abutments		3. Pile Bents	:	Y	6. Fender System	:		F
Wings	:6 Y	4. Cracking/Spalling	:5	N	7. Spur Dike&Jetty	:		F
Backwall	:6 Y	5. Steel Corrosion	:	N	8. Riprap/Slope Pav	:		F
Footing	:6 Y	6. Timber Decay etc.	:	N	9. Opening Adequacy	:7		C
Piles	: Y	7. Debris on Seats	:7	N				
Erosion	:6 Y	8. Paint or Finish	:	N	62 CULVERT	:N		
Settlement	:7 Y	9. Collision Damages	:5	N	1. Barrel			
2. Piers or Bents					Concrete	:		
Caps	:5 Y	61 CHANNEL & PROTECTION	:7		Steel	:		
Column	:4 Y	1. Channel Scour	:8	C	Timber	:		
Footing	:4 Y	2. Embankment Erosion	:7	C	2. Headwall	:		
Piles	: Y	3. Drift	:7	C	3. Cutoff Wall	:		
Scour	:6 Y	4. Vegetation	:5	C	4. Adequacy	:		
Settlement	:6 Y	5. Channel Change	:7	C	5. Debries	:		

APPROACH ALIGNMENT		TYPE OF INSPECTION	
1. Reserved	:7	Bridgemaster	:
2. Approach slab	:	Special	:Y
3. Relief joints	:	Routine	:
4. Approach Guardrail	:0		
Pavement	:8	Estimated Remaining Life	:
Embankment	:8	21. Maintenance response	:02
5. Reserved	:	22. Owner	:02
		29. ADT	:000775
RATED LOADING		30. Year of ADT	:1998
1. Posted loading (tons)	:	36. Traffic safety features	:0000
2. Legibility	:7	54. Min Vert underclearance	:N0000
3. Visibility	:7	228. Next inspection (QuarYr)	:301

BRIDGE SCOUR SCREENING

BRIDGE NAME: WAIOHONU #29
BRIDGE NO: 009003600904803
DISTRICT: HANA

PHOTO; ROLL:
FRAME:
DAT 8/31/00

A. STRUCTURE DATA:
YEAR BUILT 1915
NO. OF SPANS 5
AS BUILTS AVAILABLE?

BRIDGE LENGTH: 97'-0"
NO. OF PIERS: 4

B. IS BRIDGE CONSTRUCTED OVER WATER?	YES
IF YES, IS IT	
a. INTERMITTANT	YES
b. SMALL STREAM WITH CONTINUOUS FLOW	
c. RIVER (LARGE)	YES
D. TIDAL	
IS UNDERWATER INSPECTION REQUIRED?	NO

C. ABUTMENT	LEFT	RIGHT
1. TYPE OF ABUTMENT	VERTICAL	VERTICAL
OTHER		
2. ANY SIGNS OF SCOUR?	NONE	NONE
3. SCOUR PROTECTION IN PLACE?	NO	NO
IF SO, WHAT TYPE?		
4. ABUTMENT IN STREAMBED?	YES	YES\
5. ABUTMENT INUNDATED BY HIGH FLOW?	YES	YES
6. OVERALL CONDITION	GOOD	GOOD

COMMENTS:

D. PIERS		
1. ANY SIGNS OF SCOUR?	NO	
2. SCOUR PROTECTION IN PLACE?		NO
IF SO, WHAT TYPE?		NO
3. IS IT ON PILES?		
IF SO, LENGTH OF PILES =		
4. OVERALL CONDITION	GOOD	GOOD

5. COMMENTS Aggredation has filled minor scour areas, there is some minor erosion at abutment 2, and pier 4.

BRIDGE SCOUR SCREENING (page 2)

E. CHANNEL BOTTOM

1. SHIFTING		NO
2. AGGREDATION		NO
3. DEGREDATION		NO
4. TYPE MATERIAL OF CHANNEL BOTTOM	SOLID ROCK ROCKY	

F. OVERALL COMMENTS

G. ANALYSIS

IS ANALYSIS REQUIRED?		NO
IF YES, WHO WILL DO ANALYSIS?	IN HOUSE	CONSULTANT
IS TOPO REQUIRED?		NO
IF NO, PROVIDE SKETCH AND TAKE MEASUREMENTS.		

H. SCOUR ANALYSIS COD 2A(1)a

I. SI&A, ITEM 113 CODE 8

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
ENGINEERING DIVISION

WAIOHONU #29
Repairs & Improvements

Work done since last inspection:

1 Parapets cleaned and painted.

2

3

4

5

6

Recommended repairs and improvements:

1 Install one lane delineation, per standard plans.

2 Repair all concrete defects as described.

3 Install guardrails, and end treatments.

4 Clear all vegetaion growing on and in structure.

5 Patch a.c. wearing surface and seal.

6

recommended by:

Steven P. Newhouse
supv. const. inspector

reviewed by:

Cary Yamashita
program manager
asst. chief engineer

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
ENGINEERING DIVISION

BRIDGE NAME: WAIOHONU #29
TMK: 1-4-12

BRIDGE NO.: 009003600904803
DISTRICT: HANA

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
Repair spalls	392	SF	$598.00	$234,416.00
Repair cracks	29	LF	$175.00	$5,075.00
Repair undermines	2	CY	$575.00	$1,150.00
Install guardrails	100	LF	$125.00	$12,500.00
Install guardrail end treatments	4	EA	$1,352.00	$5,408.00
			sub total	$258,549.00
			contingency 20%	$51,709.80
			TOTAL	$310,258.80
			SAY	$311,000.00

* COUNTY OF MAUI MAINTAINENCE FORCES
Clean and paint parapets as needed.
Clear all vegetation growing on and in structure.

Prepared by:
Steven P. Newhouse, supv. inspector/team leader

date: 10/17/00

Reviewed by:
Cary Yamashita, Program Manager/Asst. Chief Engineer

date: 10/18/00

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
ENGINEERING DIVISION

WAIOHONU #29
Summary

This structure, built in 1915 is in poor condition. Girders are typically defected with spalling, reinforcing exposed, reinforcing absent, water stains, efflorescence, and cracking. The a.c. wearing surface is allowing water to infiltrate thru the slab onto the pier caps, and abutment seats. The soffit is likewisedefected. Vegetation is growing into and on structure. We will instruct our highways division to complete maintainence work in a timely manner.

summary by:

Steven P. Newhouse
supv. const. inspector

reviewed by:

Cary Yamashita
program manager
asst. chief engineer

BRIDGE INVENTORY

DEFECTS CODING GUIDE

Material	Code No.	Description of Defect
Concrete	1	Hairline Cracks in Concrete
Concrete	2	Cracks in Concrete
Concrete	3	Spalled Concrete
Concrete	4	Spalled Concrete with reinforcing exposed
Concrete	5	Scaling
Concrete	6	Honeycomb Voids
Concrete	7	Efflorescence
Concrete	8	Rust Stains
Concrete	9	Weathered/Waterstained
Timber	10	Split Timber
Timber	11	Decayed Timber
Timber	12	Crushed Timber
Timber	13	Splintered Timber
Timber	14	Weathered/Worn Timber
Timber	15	Insufficient Nailing or Bolting
Steel	16	Rusted Steel
Steel	17	Corroded Steel
Other	18	Erosion
Other	19	Undermining
Other	20	Footing exposed
Other	21	Settlement of Pavement
Other	22	Vegetation Growth
Other	23	Debris
Other	24	Scour
Other	25	Cracks on Pavement

Recommended Repair of cracks and spalls in concrete

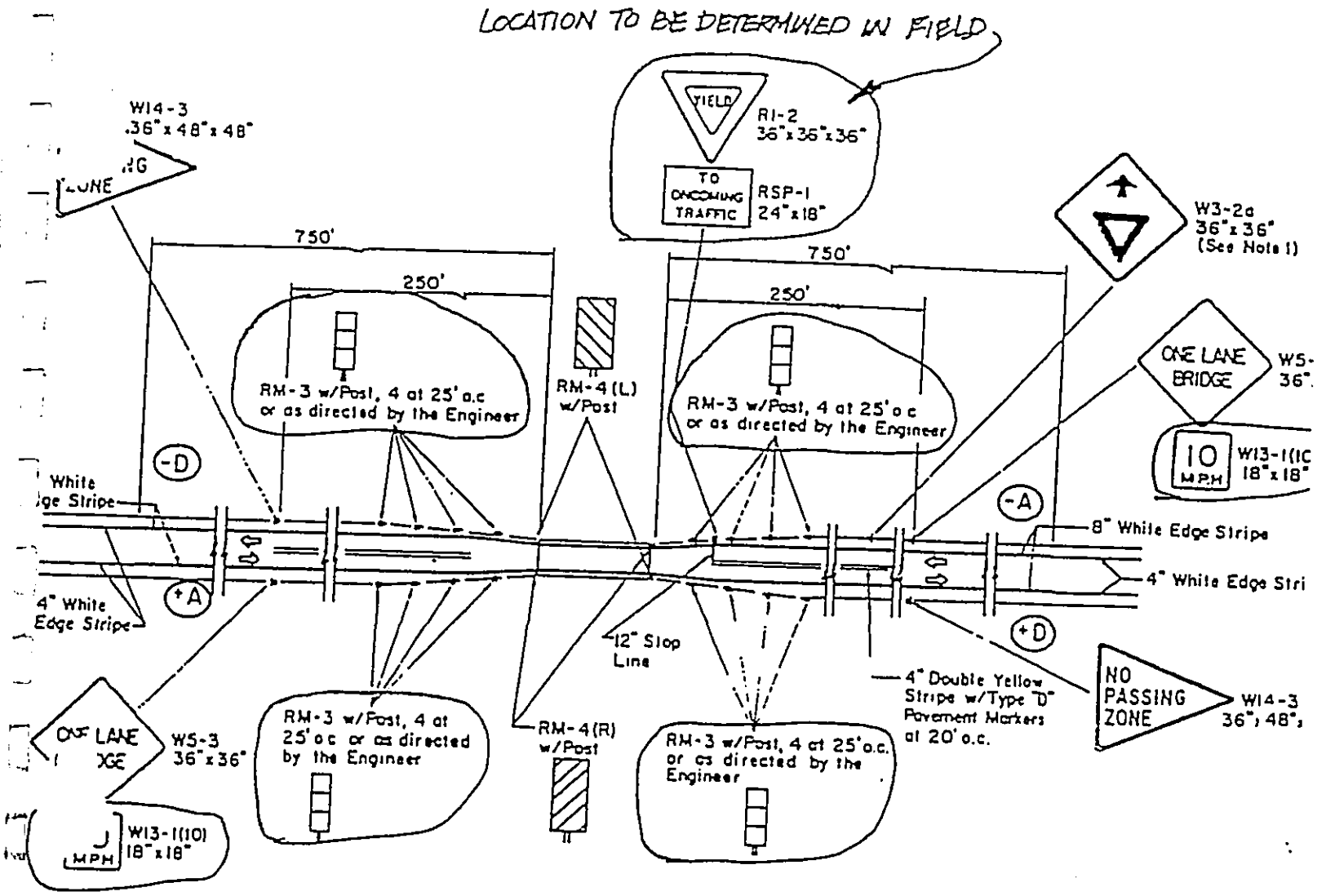
Cracks

1. Rout crack with concrete saw or chipping tools
2. Flush out crack with water or solvent
3. Allow surface to dry (use hot-air jet, if required)
4. Drill 3/4" ø holes, approximately 3/4" deep @ 6" to 12" o.c., into crack.
5. Surface seal crack with joint sealant & install epoxy injection valves in 3/4" ø holes, secured with epoxy bonding compound.
6. Inject epoxy bonding compound into crack until the compound flows out of t adjacent sections of the crack or begins to bulge out of the surface seals

Spalls

1. Remove all unsound, damaged and undersirable concrete.
2. If reinforcing is exposed, remove undesirable concrete around reinforcir to a sound substrate. Clean reinforcing steel free of rust, scales, oil and other foreign matter deleterious to bonding. (Sandblasting is desireable).
3. Clean surface to be joined free of moisture, dust, rust, etc.
4. Apply epoxy bonding compound to surface to be joined.
5. Apply lean, stiff mix concrete to repair area. If form work is involved, concrete can be applied pneumatically.

STRUCTURE NO.:	FEATURES INTERSECTED:	COUNTY of MA DEPT. of PUBLIC W
DISTRICT:		
LOCATION (T.M.K.):		INVENTORY OF BR



TYPICAL ONE LANE BRIDGE DELINEATION

NOTES:

1. YIELD AHEAD sign (W3-2a) shall be installed only on approaches to a YIELD sign (R1-2) that is not visible for a sufficient distance to permit a driver to bring his vehicle to a stop at the YIELD sign. Final location will be determined in the field by the Engineer.
2. Stop line and YIELD signs shall be installed on the approach that has the longer or better sight distance. Final location will be determined in the field by the Engineer.
3. Signs shall be spaced a minimum of 125 feet apart in the same direction of traffic.

treatment

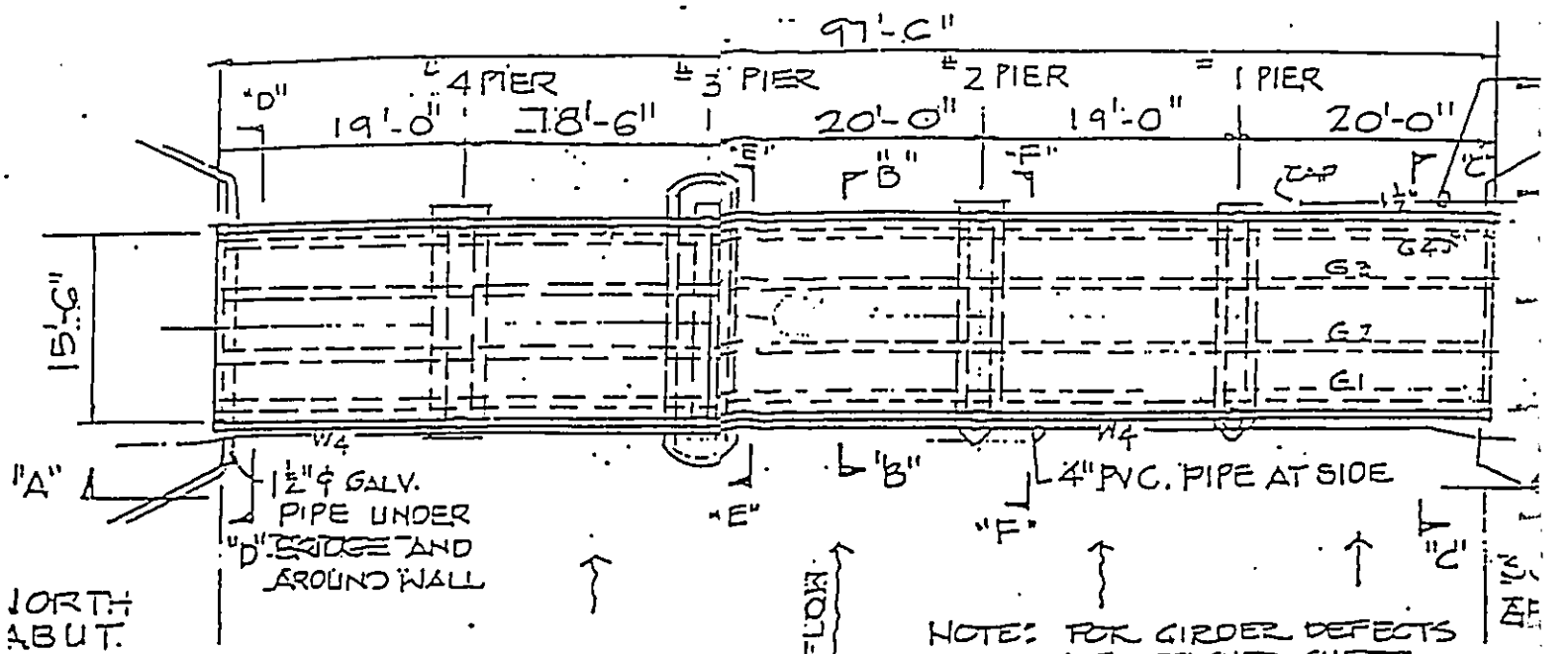
DATE	REVISION	APP'D

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD PLAN TE-67

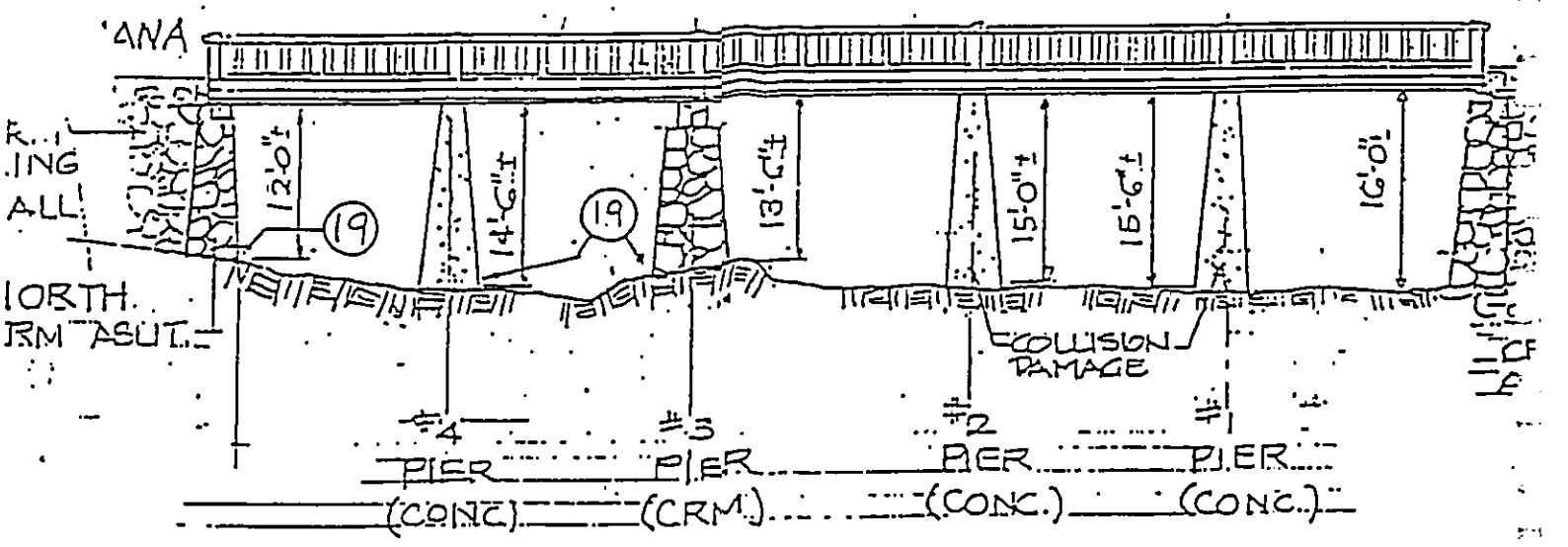
DELINEATION AND PAVEMENT MARKINGS AT BRIDGES

Eiichi Tanaka — APPROVED
2/29/84 — DATE



PLAN

SCALE: 1/16" = 1'-0"



WEST ELEVATION "A-A"

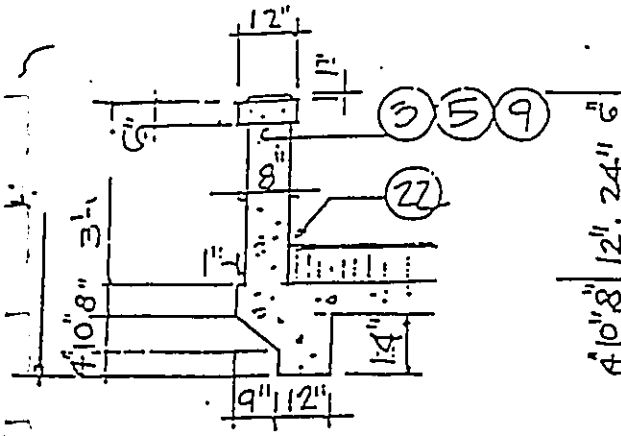
SCALE: 1/16" = 1'-0"

WAIOHONU BRIDGE @ HANA HWY/WAIOHONU STREAM

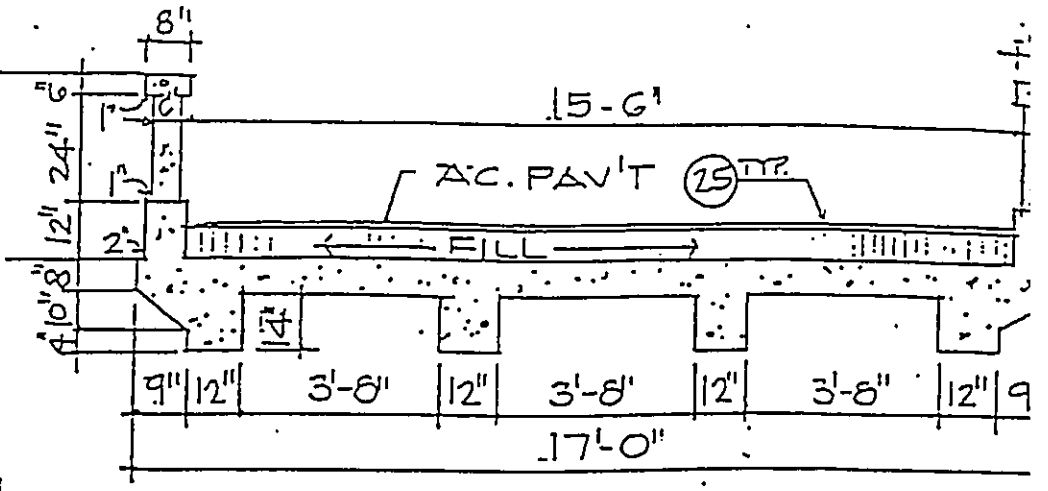
TRUCTURE NO.: 29	FEATURES INTERSECTED: WAIOHONU STREAM
STRICT: EAST HANA	
LOCATION (T.M.K.):	

COUNTY of M
DEPT. of PUBLIC W

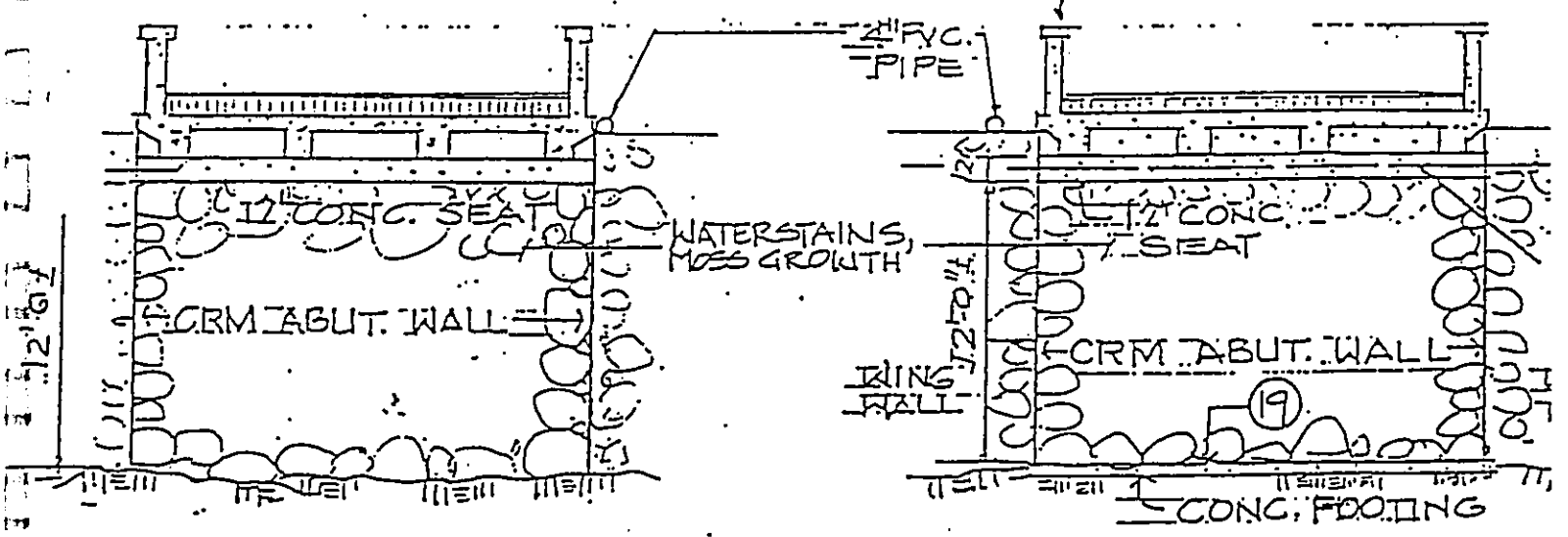
INVENTORY OF "B"



END POST @
MID POST DET. "X"
SCALE: 1/4" = 1'-0"



TYPICAL CROSS SECTION "B-B"
SCALE: 1/4" = 1'-0"

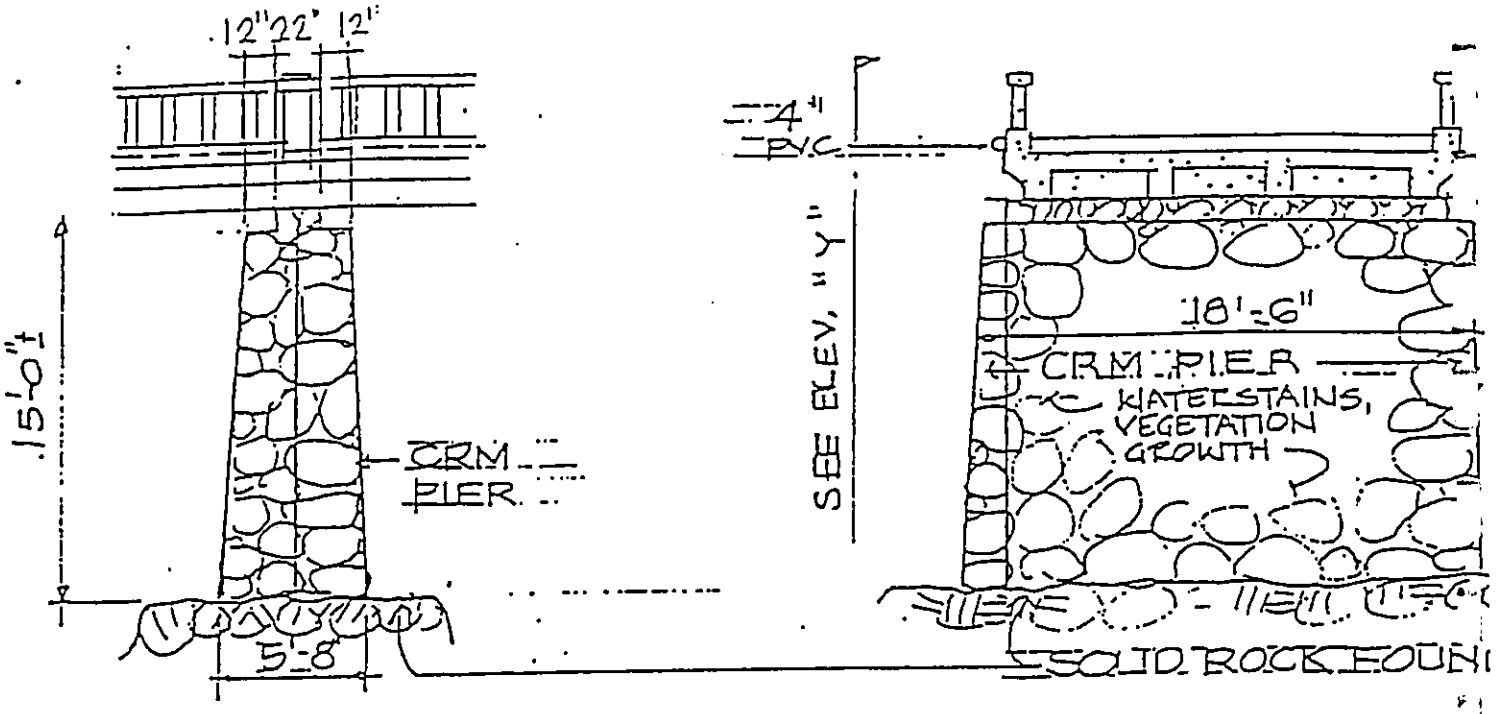


SOUTH ABUT. SECTION "C-C"
SCALE: 1/8" = 1'-0"

NORTH ABUT. SECTION "D-D"
SCALE: 1/8" = 1'-0"

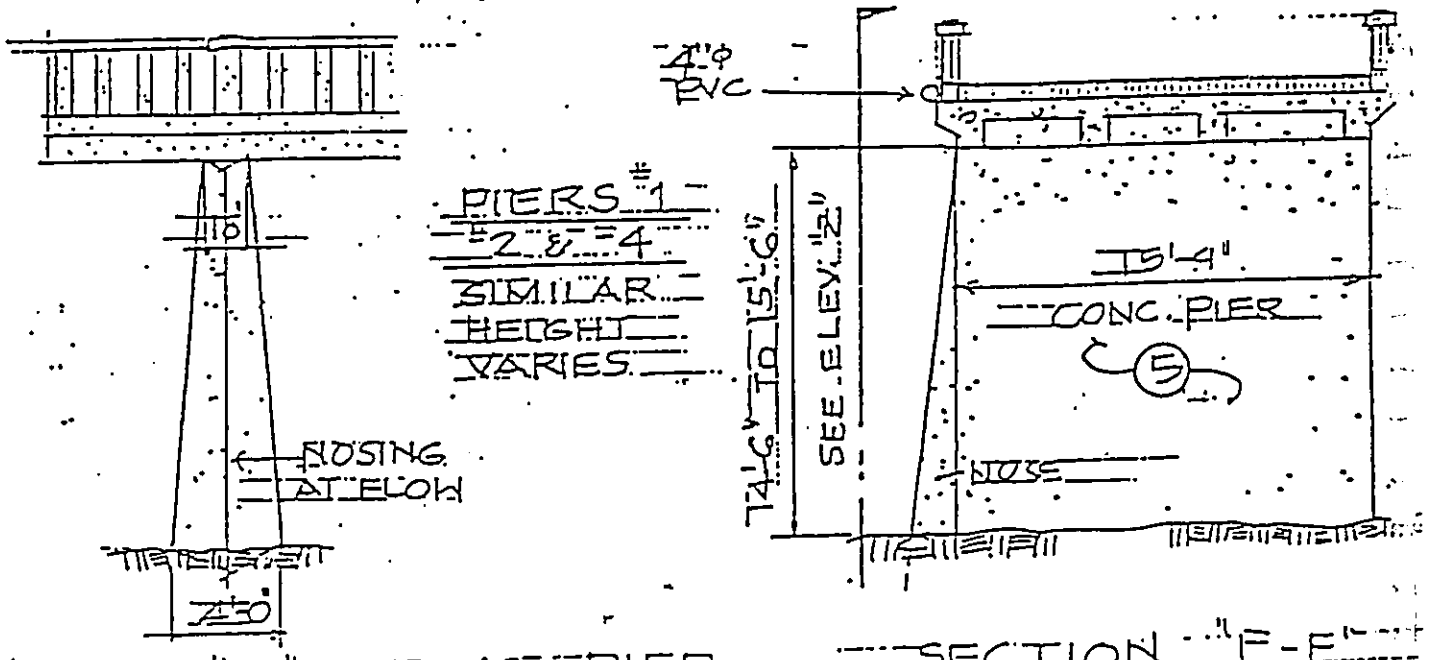
WAIOHONU BRIDGE

STRUCTURE NO.: 29	FEATURES INTERSECTED: WAIOHONU STREAM	COUNTY of MAI
STRICT: EAST HANA		DEPT. of PUBLIC W
LOCATION (T.M.K.): 1-4-12		INVENTORY OF BR



ELEV. "Y" CRM #3 PIER SECTION "E-E"

SCALE: 1/8" = 1'-0"



ELEV. "Z" CONC. PIER SECTION "F-E"

SCALE: 1/8" = 1'-0"

WAIOHONU BRIDGE

STRUCTURE NO.: 29

DISTRICT: EAST HANA

LOCATION (T.M.K.): 1-4-12

FEATURES INTERSECTED: WAIOHONU STREAM

COUNTY of M

DEPT. of PUBLIC

INVENTORY OF

☐ ARCHITECTURAL
☒ STRUCTURAL
☐ CIVIL
☐ PLANNING

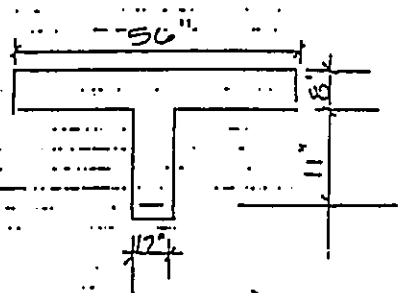
WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY RKI
CHECKED BY
DATE AUGUST 1980

KAIOHAU BRIDGE
#29

PROJECT 80269-01
SHEET NO. 2 OF 2 SHEETS

CHECK GIRDER:



C-C = 56"

$A_s = \frac{20 \times 12}{4} = 60$ in²

$A_s = 5$ in²

$\frac{12 K_d^2}{2} + 44 \times 6(K_d - 4) = 15(5)(17 - K_d)$

$K_d^2 + 71.17 K_d = 472.17$

$K_d = 6.11"$ $\quad j_d = 16.96"$

$M_s = \frac{15}{12} \times 16.96 \times 5 = 127.2^{k-1}$

$M_c = \frac{.8}{2} \times 6.11 \times 16.96 \times \frac{56}{12} = 173.42^{k-1}$

CHECK DEAD LOAD:

$.184 \times 4.67 + \frac{.14 \times 12}{144} \times .15 = 1.03^{k/l}$ $\quad M = \frac{1.03(20)^2}{8} = 51.71^{k-1}$

$M_{INV} = 127.2 - 51.71 = 75.49^{k-1}$ $\quad M_{OPER} = 176.67 - 51.71 = 124.96^{k-1}$

CHECK H.S.20 LOADING:

$\frac{4.67}{6} \times 16 \times 1.3 = 16.19^k$ $\quad M = \frac{16.2(20)}{4} = 81^{k-1}$

INVENTORY RATING:

$\frac{75.49}{81} \times 20 = H\ 18.64$

OPERATING:

$\frac{124.96}{81} \times 20 = H\ 30.85$

☐ ARCHITECTURAL
☒ STRUCTURAL
☐ CIVIL
☐ PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY ELH
CHECKED BY
DATE AUG 1980

WAIOHONU BRIDGE
#29

PROJECT C-3545-01
SHEET NO. 1 OF 2 SHEET

5 SPAN CONCRETE SLAB/GIRDER BRIDGE

INVENTORY

$f_c = 900$ psi

$f_s = 18000$ psi

OPERATING

$f_c = 1100$ psi

$n = 15$

$f_s = 25000$ psi

CHECK SLAB

$t = 8"$ $d = 8 - 2.5 = 5.5"$

$A_s = 3/8" \phi$ @ 4" o/c $= .42 in^2/ft$

$\frac{12kd^2}{2} - 15(.42)(5.5 - kd) = 0$

$kd^2 + 1.05kd = 5.78 = 0$

$kd = 1.93"$ $jd = 4.86"$

$M_c = \frac{.8}{2} \times 1.93 \times 4.86 = 3.75^{k-i}$

$M_s = \frac{15}{12} \times 4.86 \times .42 = 3.06^{k-i}$

DEAD LOAD:

$\frac{2}{12} \times 144 = 24$

$\frac{6}{12} \times 120 = 60$

$\frac{8}{12} \times 150 = \frac{100}{184 \#/ft}$

$M_{DL} = \frac{184(4.67)^2}{10} = .4^{k-i}$

$M_{INV} = 3.06 - .4 = 2.64^{k-i}$ $M_{oper} = 4.25 - .4 = 3.85^{k-i}$

CHECK HS 20 LOADING:

$\frac{(4.67+2)}{32} \times 16 \times 1.3 = 4.34^{k-i}$

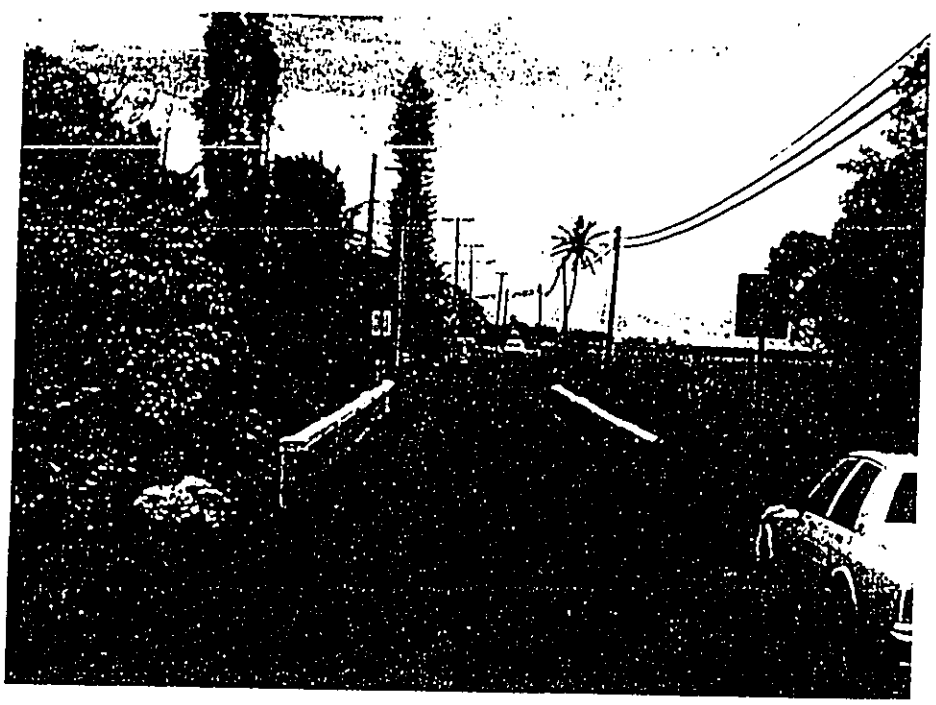
INVENTORY

$\frac{2.64}{4.34} \times 20 = H\ 12.17$

OPERATING

$\frac{3.85}{4.34} \times 20 = H\ 17.74$

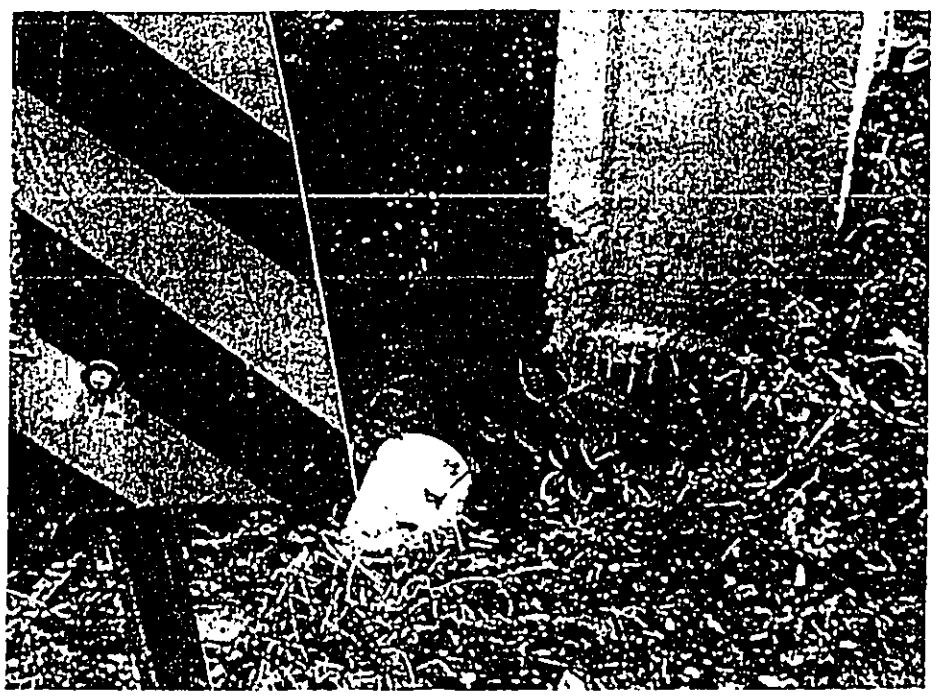
County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803



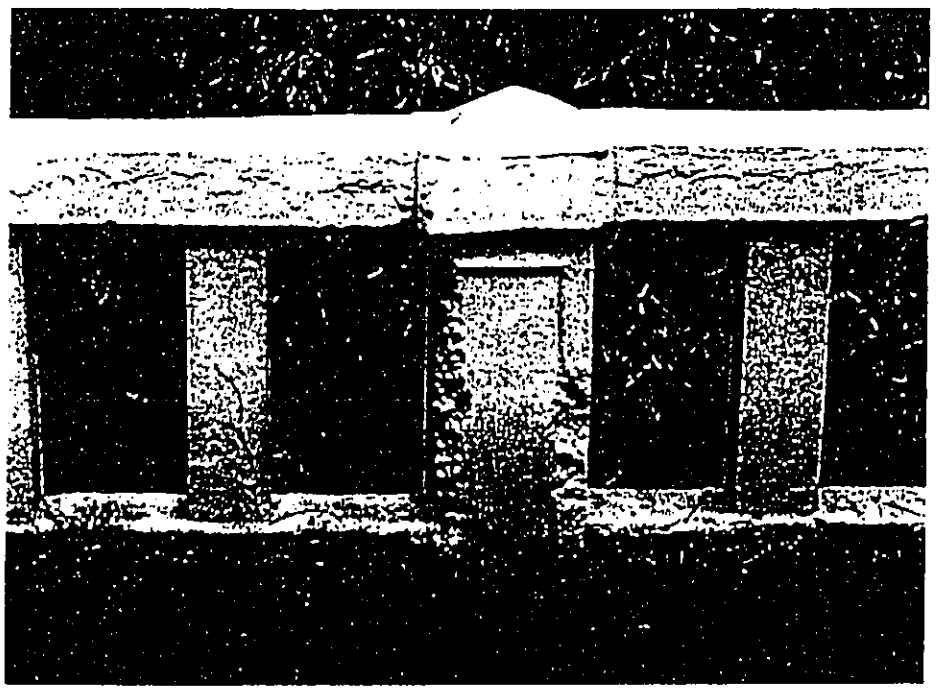
Approach looking towards Hana.

Elevation looking upstream.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

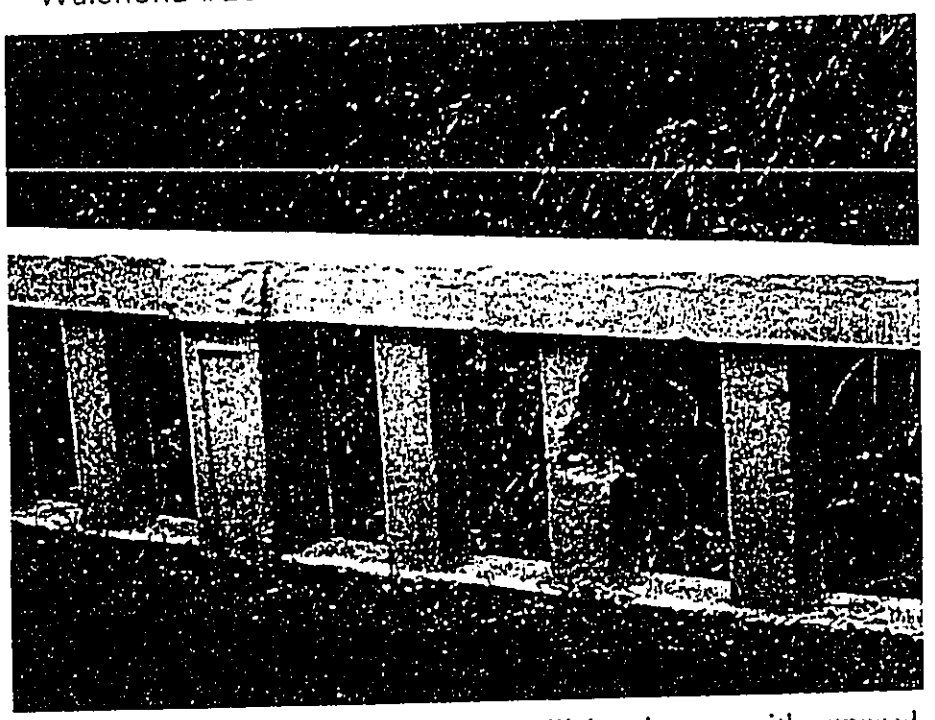


Upstream Kaupo side, 6 in. PVC drain.

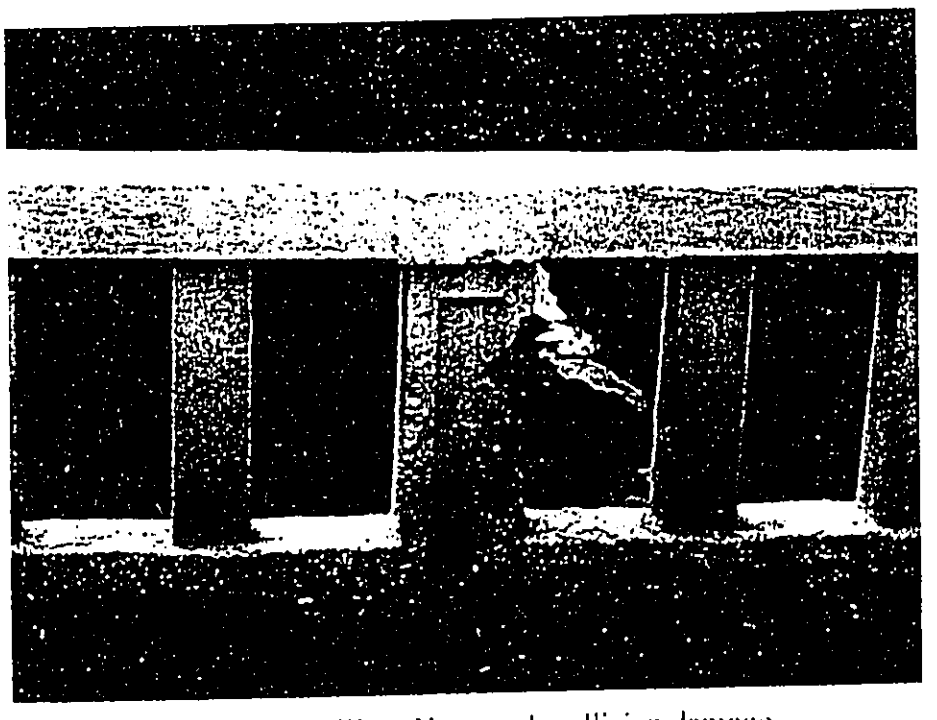


Upstream concrete railing, mid span, collision damage.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

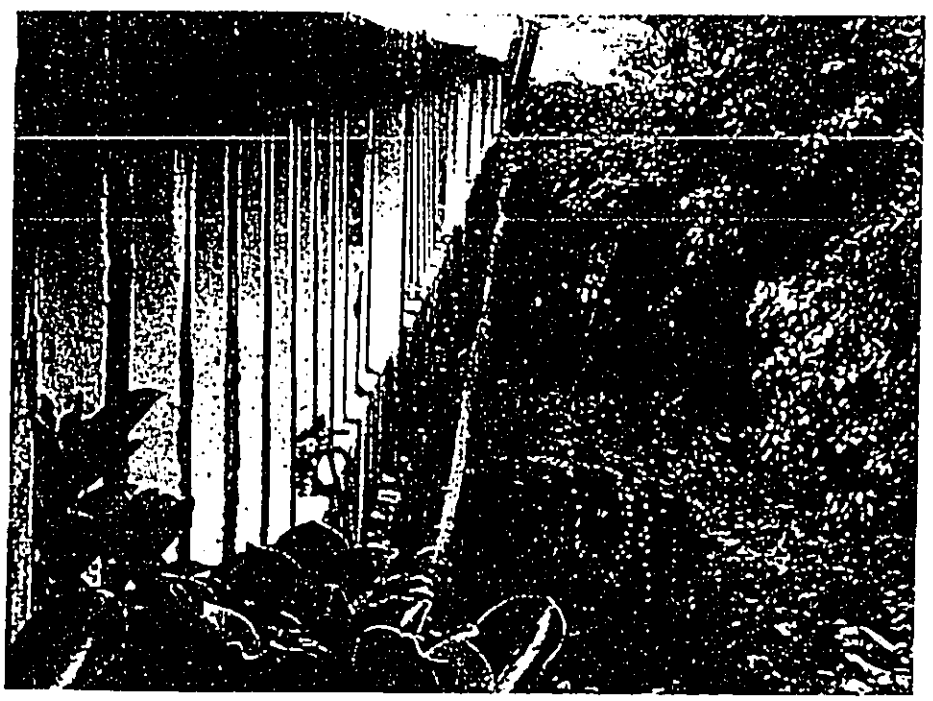


Upstream concrete railing, Hana side, collision damage with exposed rusted reinforcing steel, major section loss.



Downstream concrete railing, Hana end, collision damage.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803



Upstream 6 in. plastic water line suspended from railing.

Downstream, Hana side abutment #2, wingwall, vertical crack 1/2 in. wide.

County of Maui
Department of Public Works - Engineering Division
Bridge Photographs with Descriptions.
Waiohonu #29 Structure Number: 009003600904803

Upstream. Abutment #1 wingwall, crack 1 in. to 2 in. wide x 8 ft. long, vegetation growing out of wingwall.

Upstream. Abutment #1 Kaupo side, vegetation growth.

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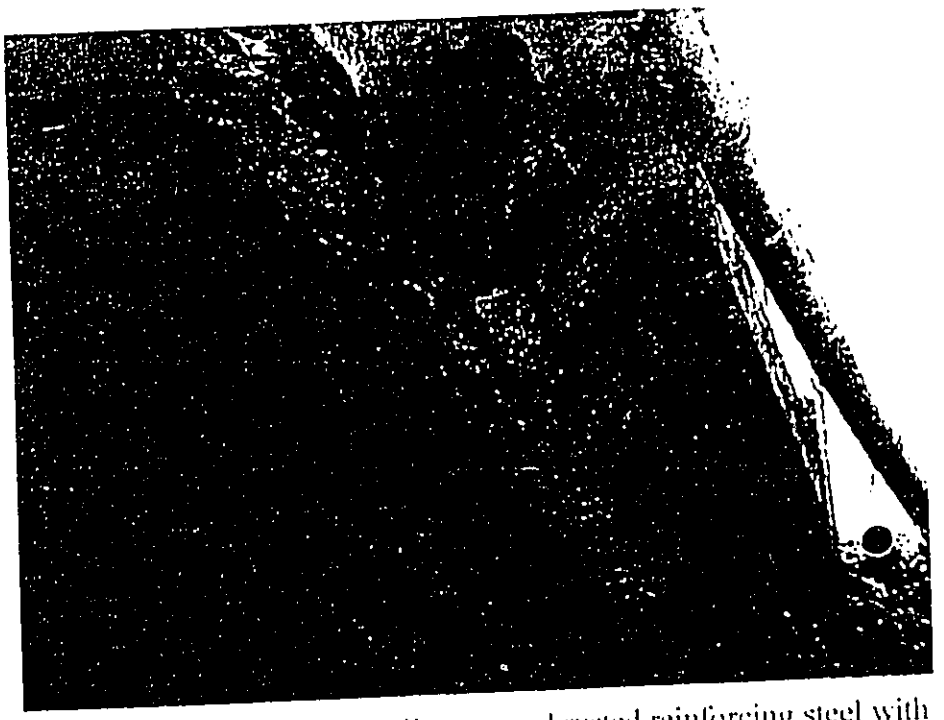
Abutment #1, honeycomb, water stains, rust stains, efflorescence, mold, mildew, scaling.



Span 1, Girder 1, typical spalls, exposed rusted reinforcing steel with section loss to bottom bars and stirrups, moderate efflorescence, water stains, rust stains, mold, mildew, moss growth, longitudinal cracks entire length of G1.

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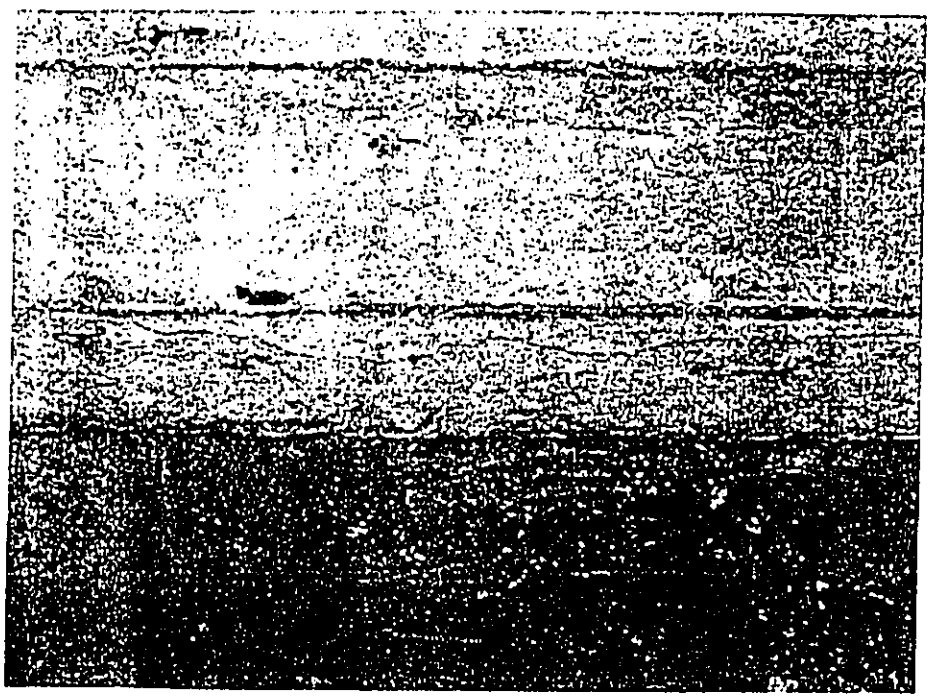
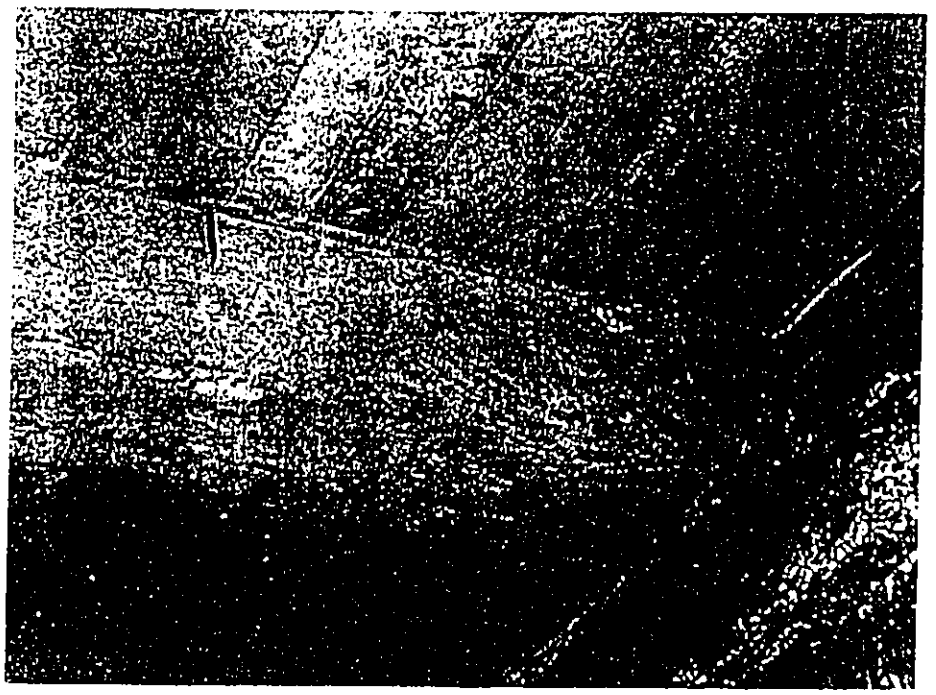


Span 1, Girder 2, longitudinal crack 8 ft. in length.



Span 1, Girder 2 @ Abutment #1. Exposed rusted reinforcing steel due to inadequate cover.

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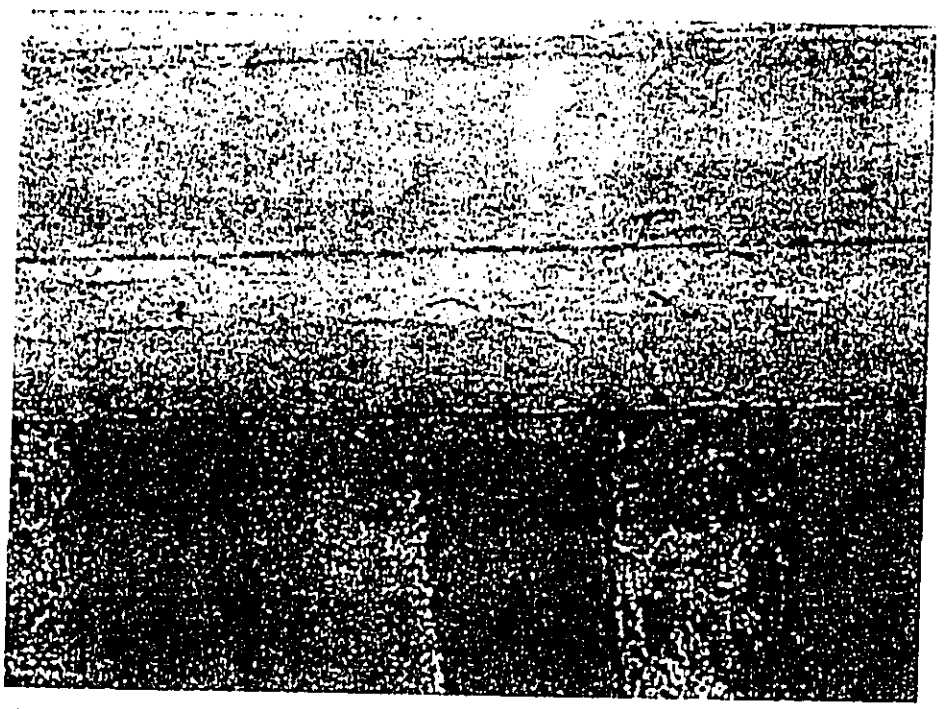
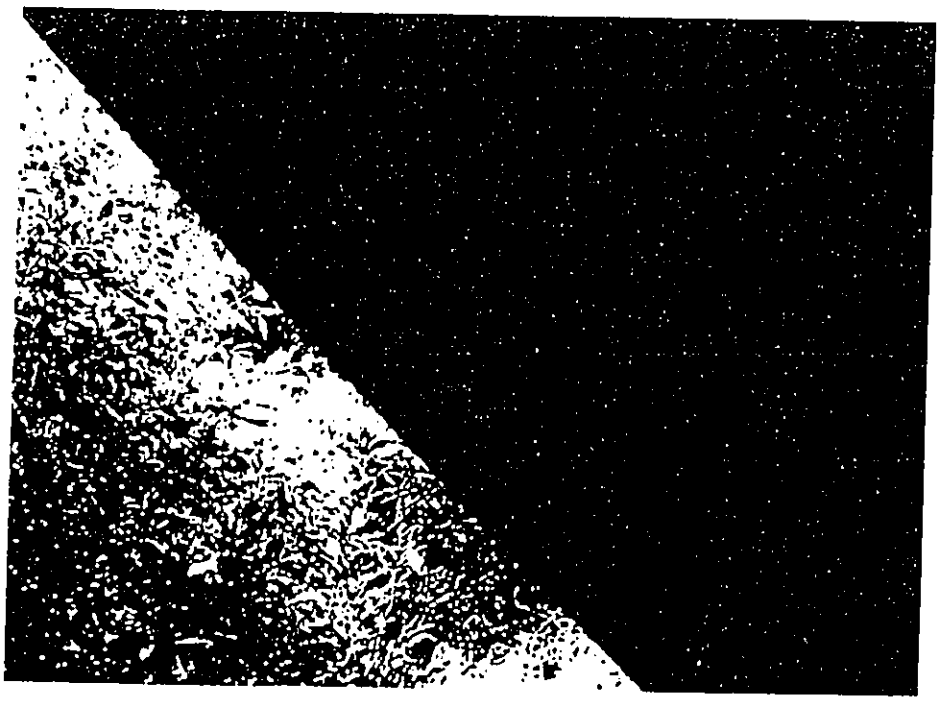


Span 1, Girder 3, cracks hairline to 1/16 in. wide x 6 ft. long.



Span 1, Girder 4, cracks along bottom face, spalls with exposed rusted reinforcing steel with complete section loss.