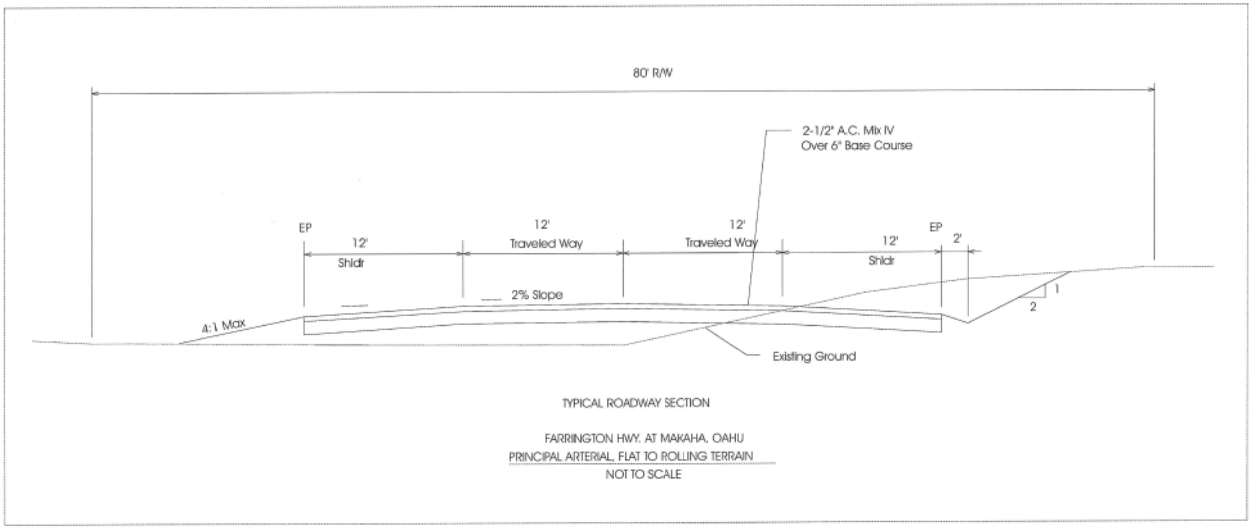
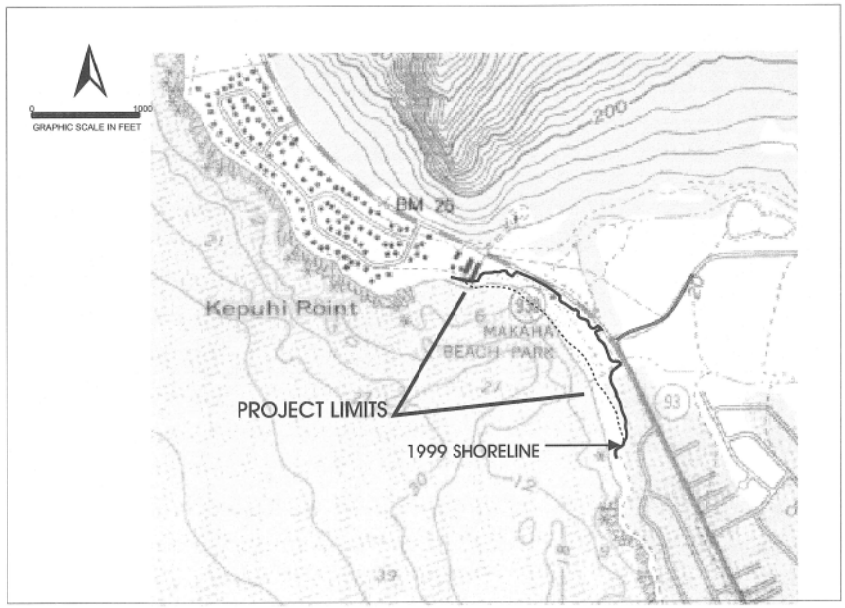


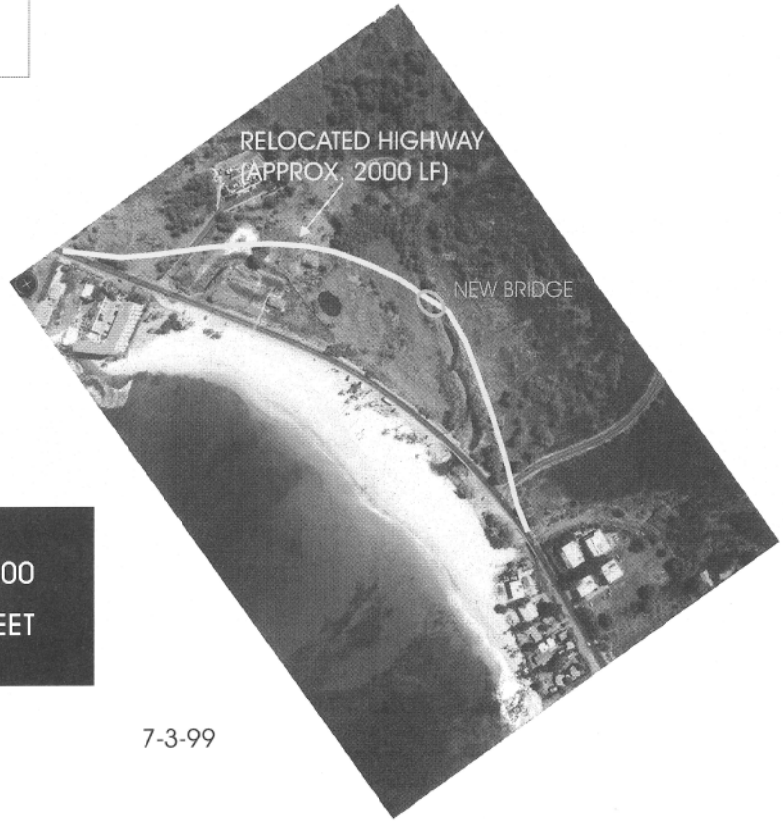
TYPICAL ROADWAY SECTION

FARRINGTON HWY. AT MAKAHA, OAHU
PRINCIPAL ARTERIAL, FLAT TO ROLLING TERRAIN
NOT TO SCALE

REAL ESTATE (R/W ACQUISITION):	$2,000,000
PLANNING & PERMITTING:	$ 690,900
ENGINEERING & DESIGN:	$ 690,900
CONSTRUCTION COST:	$5,851,900
TOTAL COST FOR ALTERNATIVE:	$9,233,700



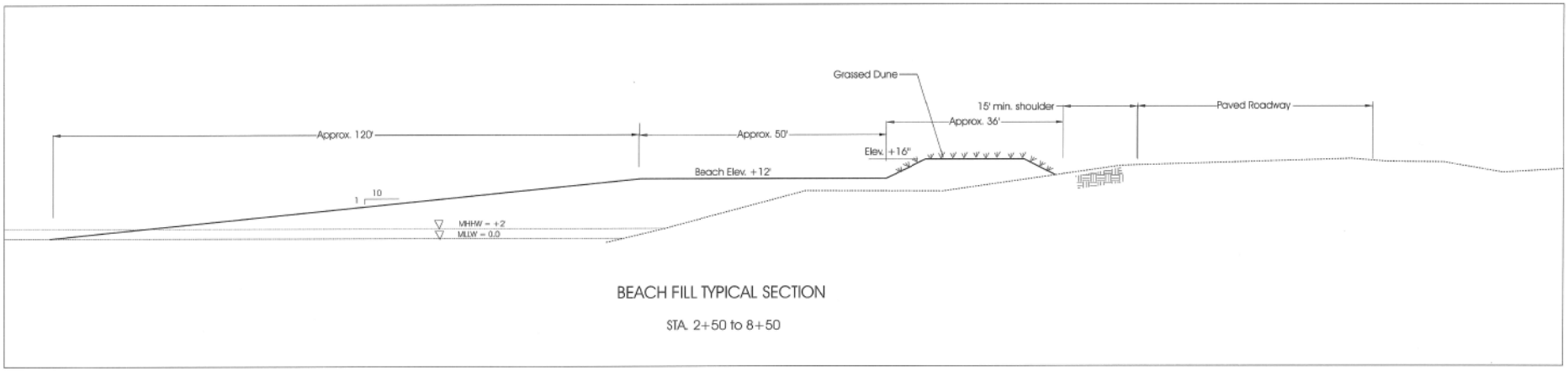
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GRAPHIC SCALE IN FEET



7-3-99

ALTERNATE PLAN - RELOCATE HIGHWAY
MAKAHA, OAHU

Statewide Highway Shoreline Protection
Project number HWY-08-98



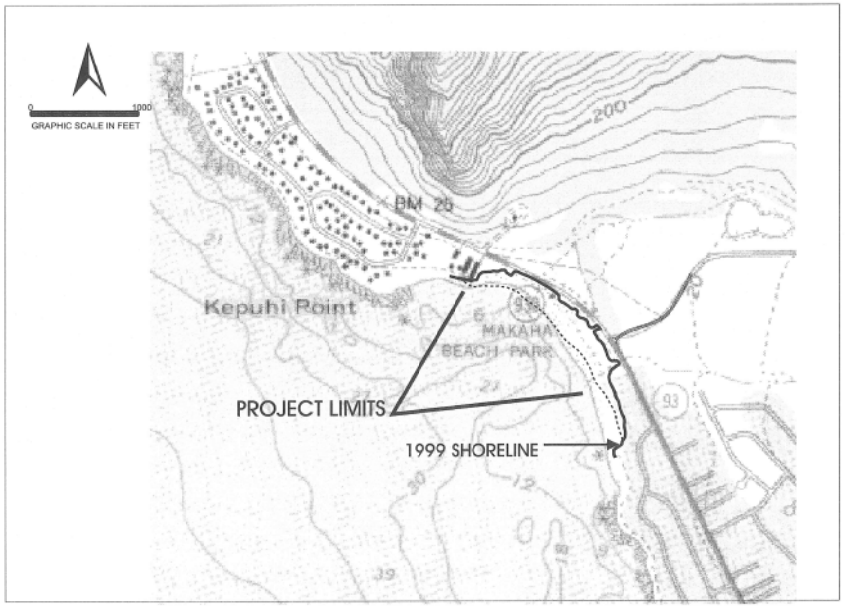
BEACH FILL TYPICAL SECTION

STA. 2+50 to 8+50

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 241,300
ENGINEERING & DESIGN: $ 241,300
CONSTRUCTION COST: $2,043,900

TOTAL COST FOR ALTERNATIVE: $2,526,500

BEACH NOURISHMENT: $273,000 / YR





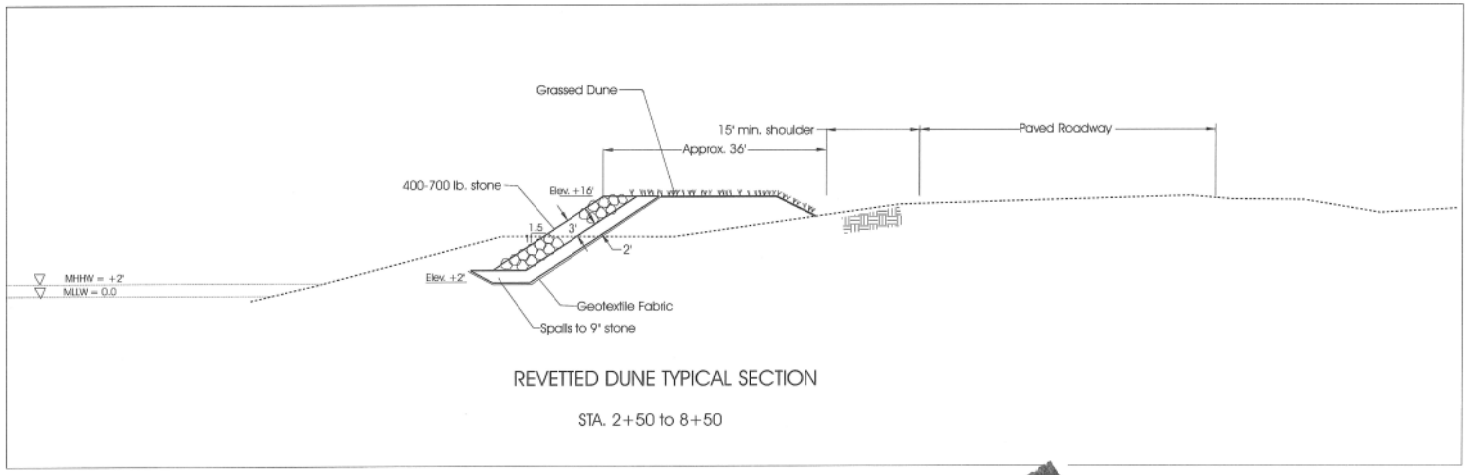
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GRAPHIC SCALE IN FEET

7-3-99

ALTERNATE PLAN - BEACH FILL WITH GRASSED DUNE
MAKAHA, OAHU

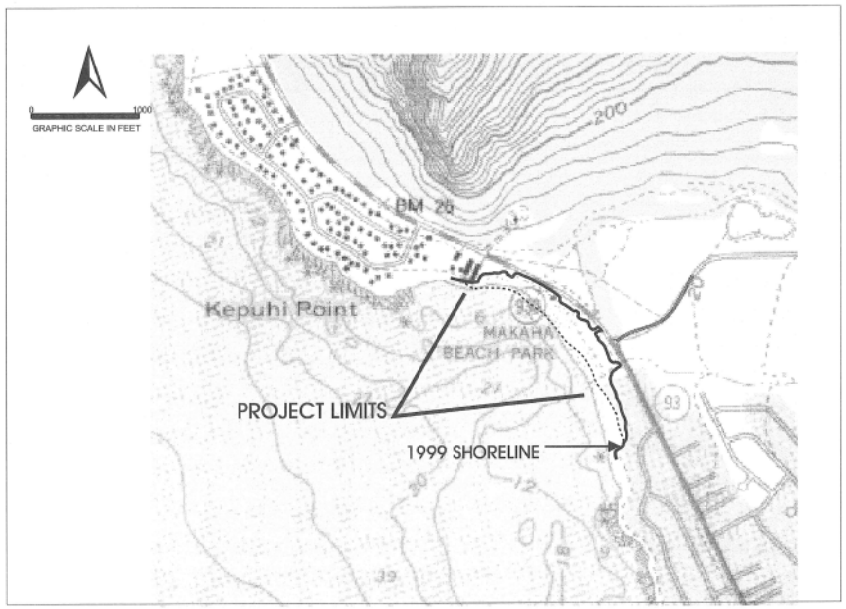
Statewide Highway Shoreline Protection
Project number HWY-08-98

REAL ESTATE (R/W ACQUISITION):	$ N/A
PLANNING & PERMITTING:	$ 122,600
ENGINEERING & DESIGN:	$ 122,600
CONSTRUCTION COST:	$1,038,700
TOTAL COST FOR ALTERNATIVE:	$1,283,900



REVETTED DUNE TYPICAL SECTION

STA. 2+50 to 8+50





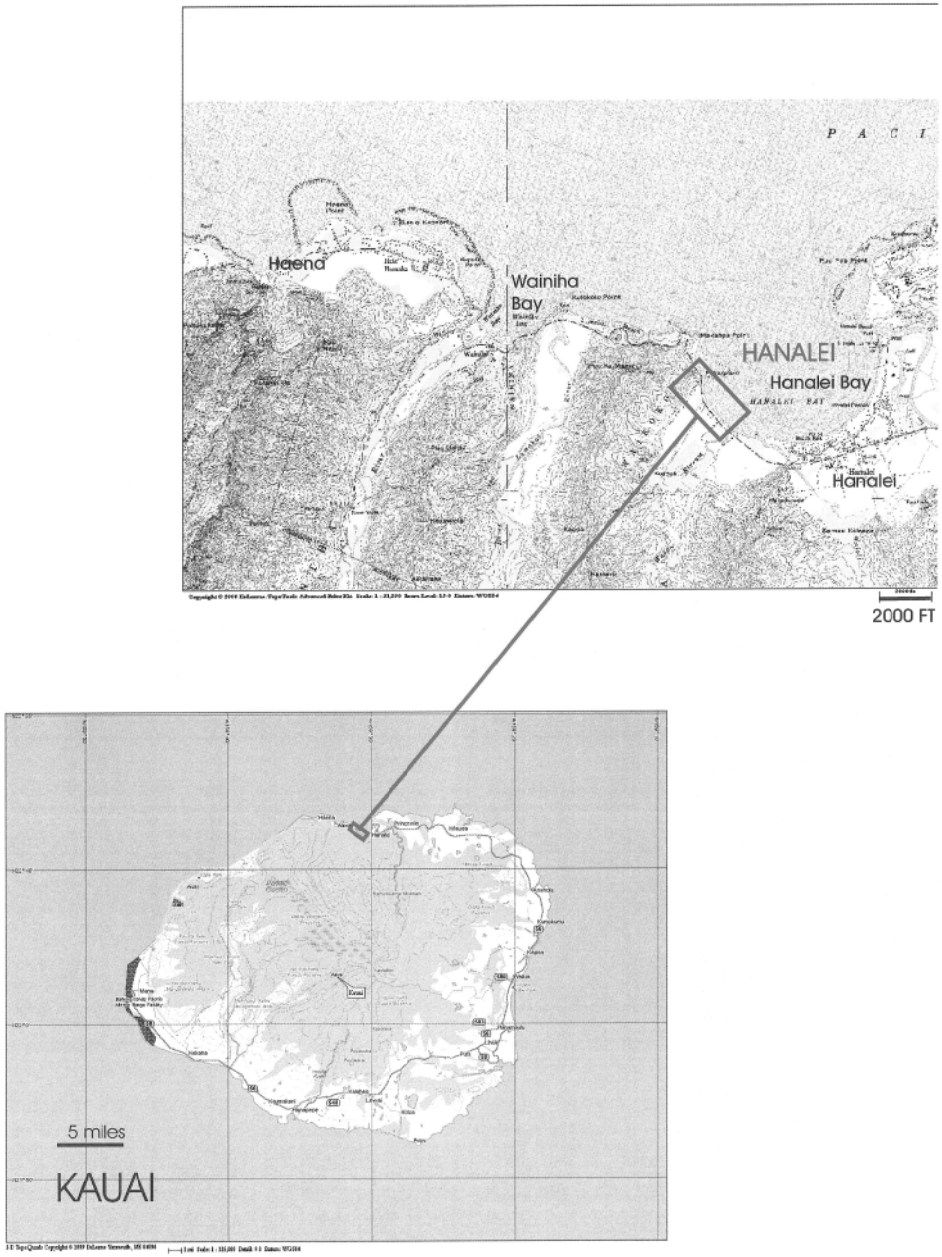
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GRAPHIC SCALE IN FEET

7-3-99

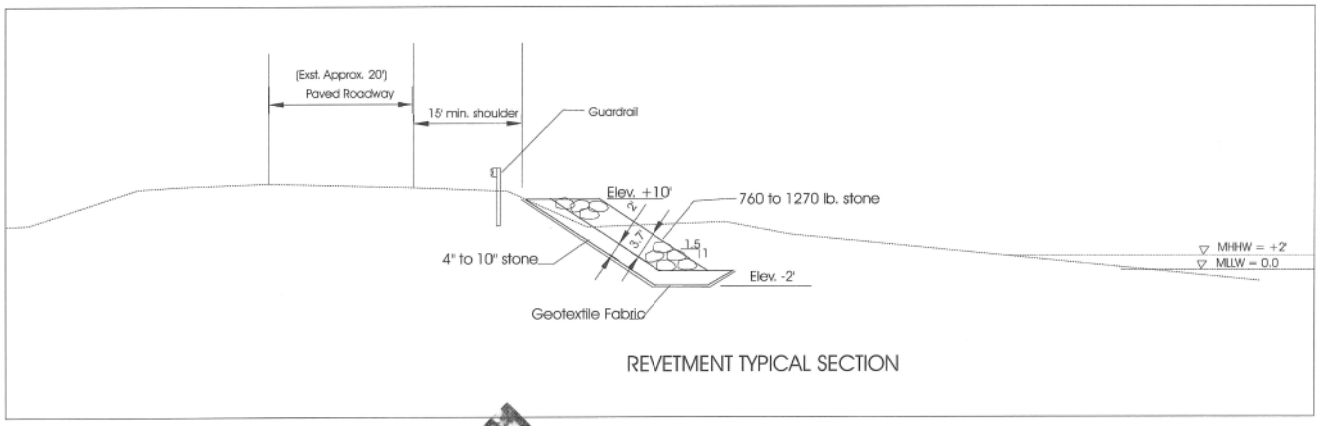
ALTERNATE PLAN - REVETTED DUNE
MAKAHA, OAHU

Statewide Highway Shoreline Protection
Project number HWY-08-98



ISLAND OF KAUAI
PRIORITY AREAS - ALTERNATIVE PLANS

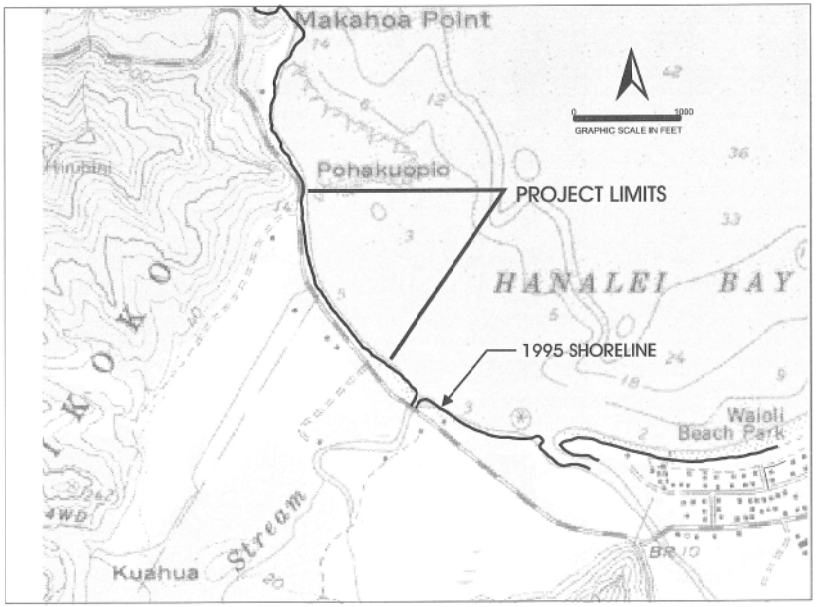
Statewide Highway Shoreline Protection
Project number HWY-08-98



REVETMENT TYPICAL SECTION

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 264,900
ENGINEERING & DESIGN: $ 264,900
CONSTRUCTION COST: $2,243,400

TOTAL COST FOR ALTERNATIVE: $2,773,200



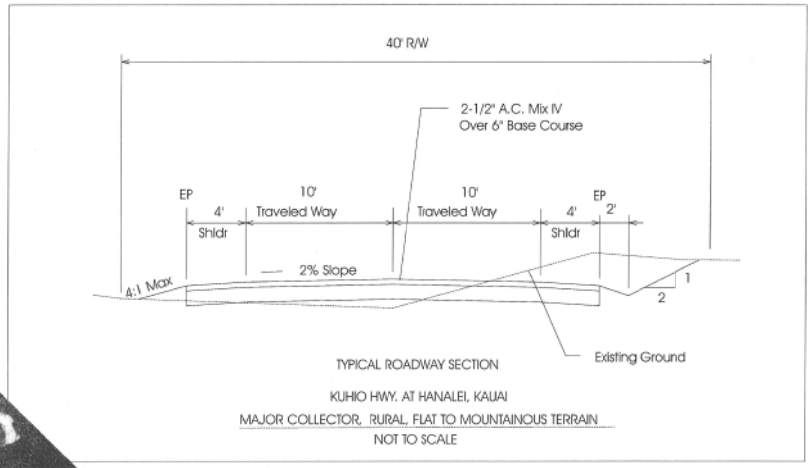


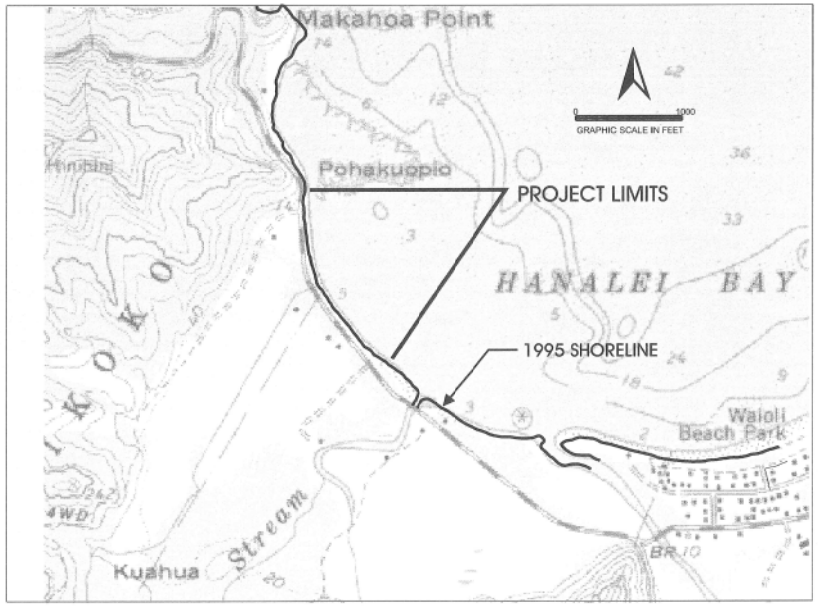
3-14-95

ALTERNATE PLAN - REVETMENT
HANALEI BAY, KAUAI

Statewide Highway Shoreline Protection
Project number HWY-08-98

REAL ESTATE (R/W ACQUISITION):	$ 500,000
PLANNING & PERMITTING:	$ 1,174,100
ENGINEERING & DESIGN:	$ 1,174,100
CONSTRUCTION COST:	$ 9,944,800
TOTAL COST FOR ALTERNATIVE:	$12,793,000



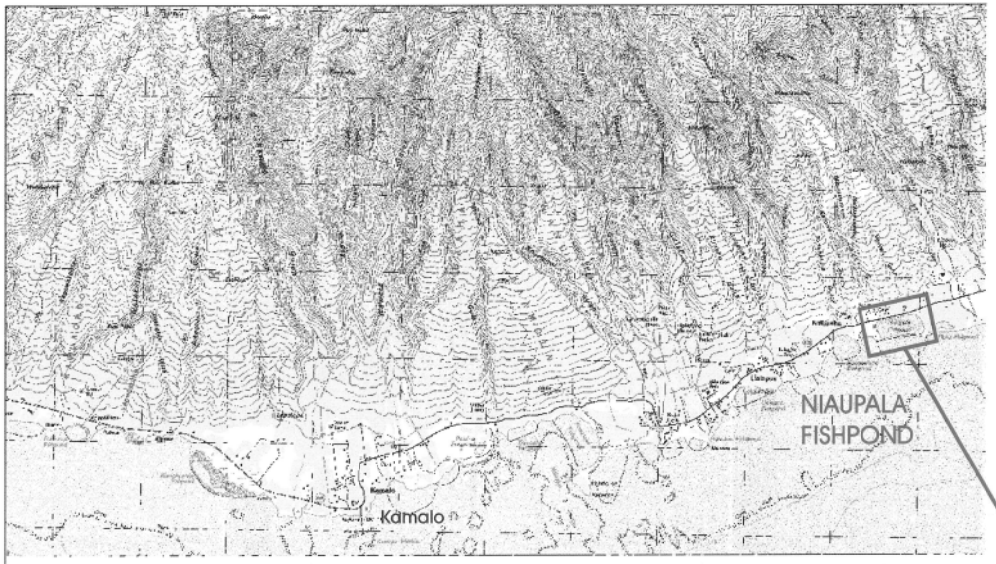


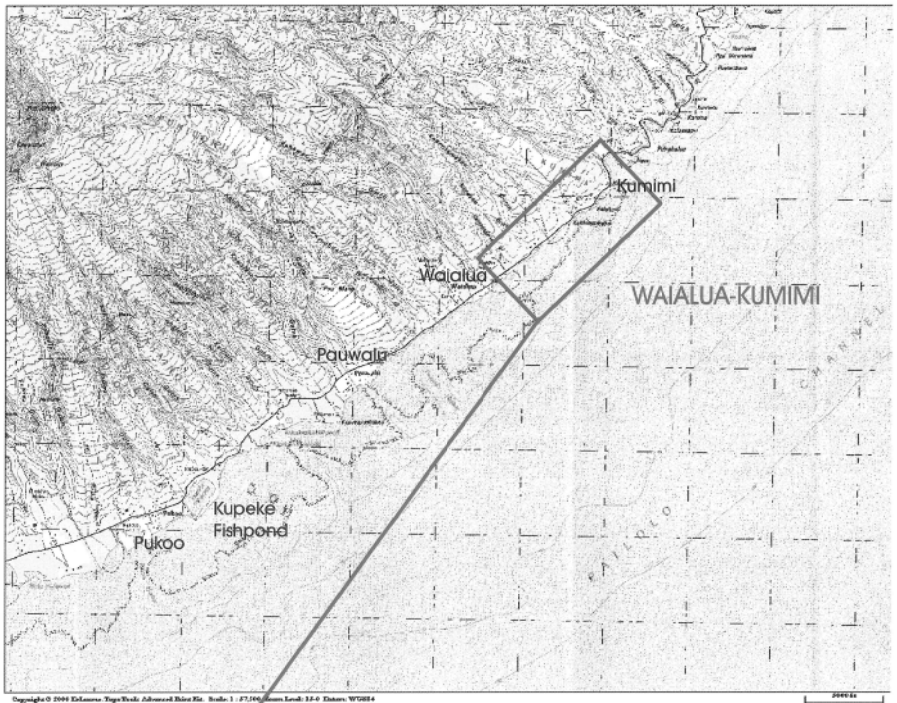


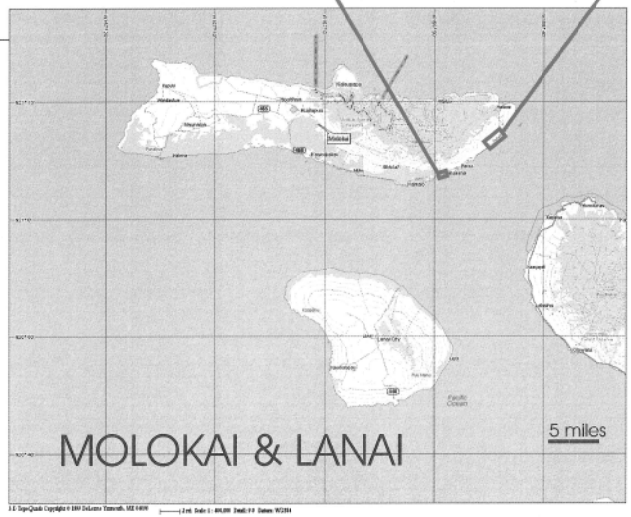
3-14-95

ALTERNATE PLAN - RELOCATE HIGHWAY
HANALEI BAY, KAUAI

Statewide Highway Shoreline Protection
Project number HWY-08-98

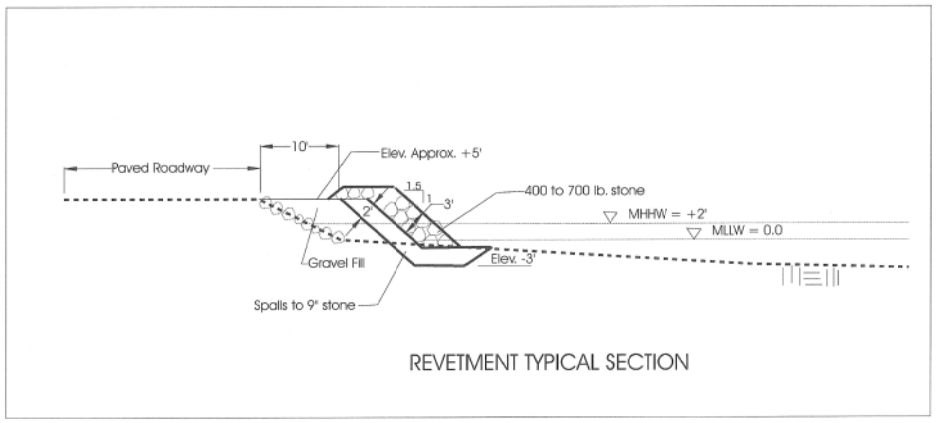






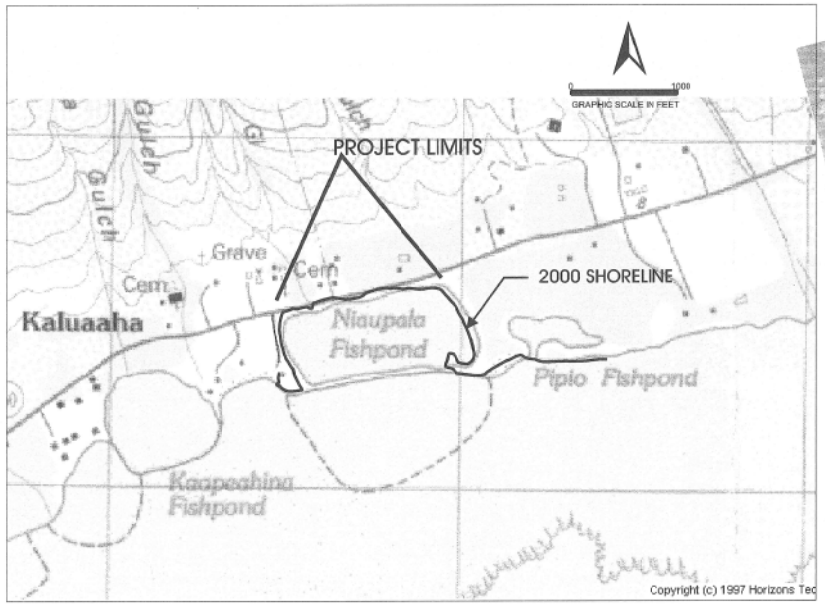
ISLAND OF MOLOKAI
PRIORITY AREAS - ALTERNATIVE PLANS

Statewide Highway Shoreline Protection
Project number HWY-08-98



REVETMENT TYPICAL SECTION

REAL ESTATE (R/W ACQUISITION):	$ N/A
PLANNING & PERMITTING:	$ 162,800
ENGINEERING & DESIGN:	$ 162,800
CONSTRUCTION COST:	$1,378,600
TOTAL COST FOR ALTERNATIVE:	$1,704,200

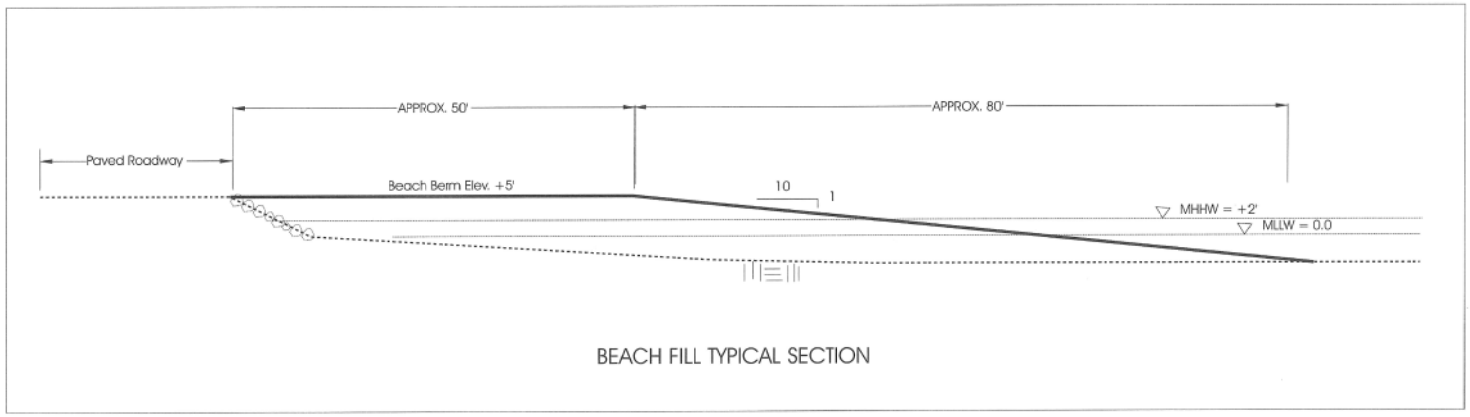




ALTERNATE PLAN - REVETMENT
NIAUPALA FISHPOND, MOLOKAI

1-24-00

Statewide Highway Shoreline Pro
Project number HWY-08-98

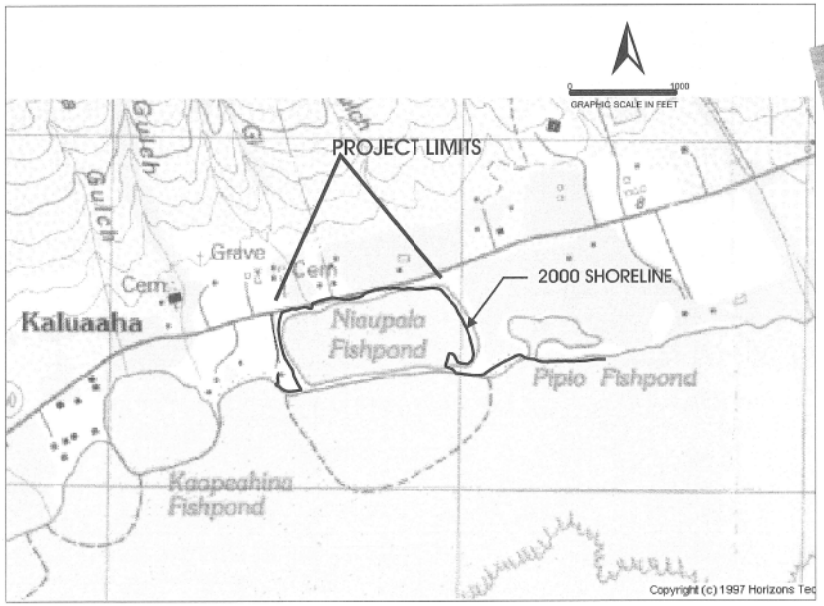


BEACH FILL TYPICAL SECTION

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 304,800
ENGINEERING & DESIGN: $ 304,800
CONSTRUCTION COST: $2,581,400

TOTAL COST FOR ALTERNATIVE: $3,191,000

BEACH NOURISHMENT: $Negligible

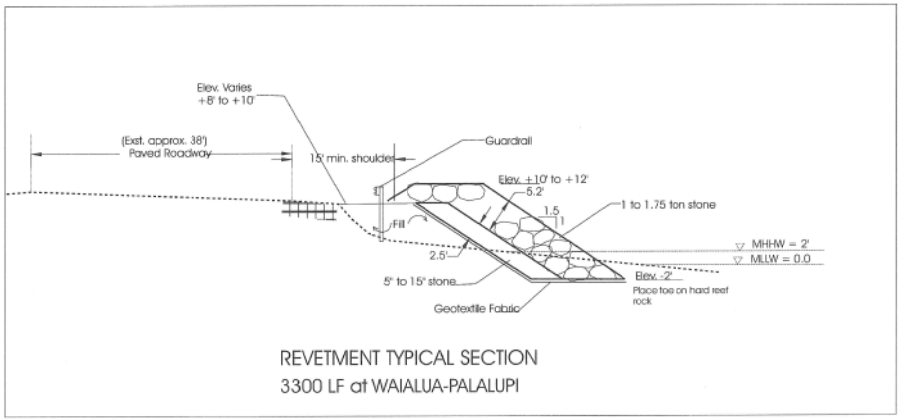




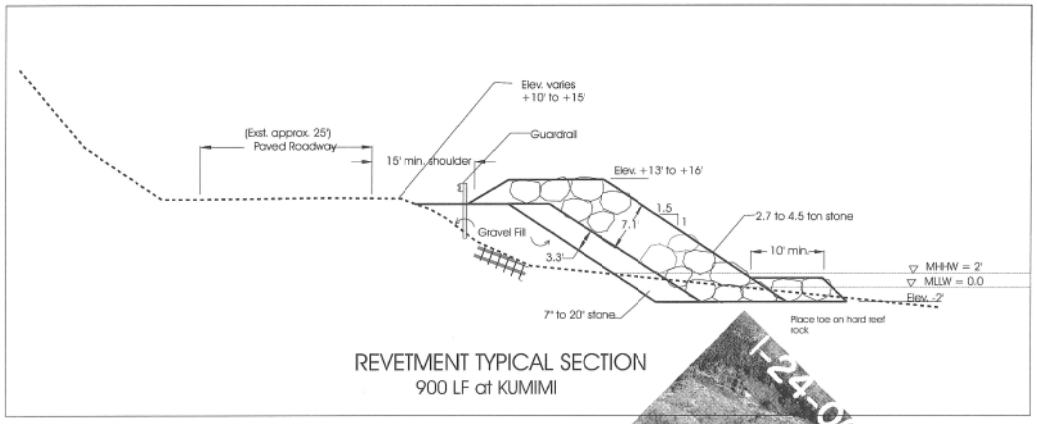
ALTERNATE PLAN - BEACH FILL
NIAUPALA FISHPOND, MOLOKAI

Statewide Highway Shoreline Pro
Project number HWY-08-98

1-24-00



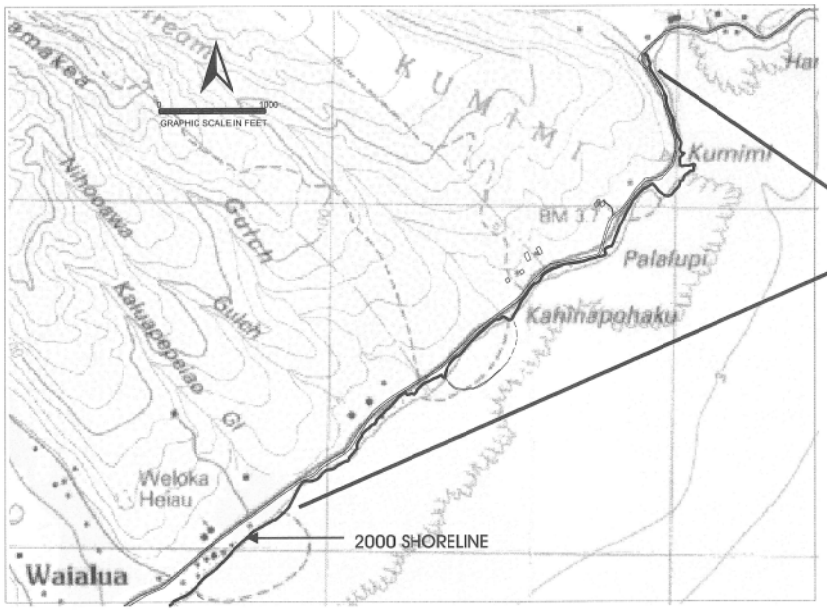
REVETMENT TYPICAL SECTION
3300 LF at WAIALUA-PALALUPI



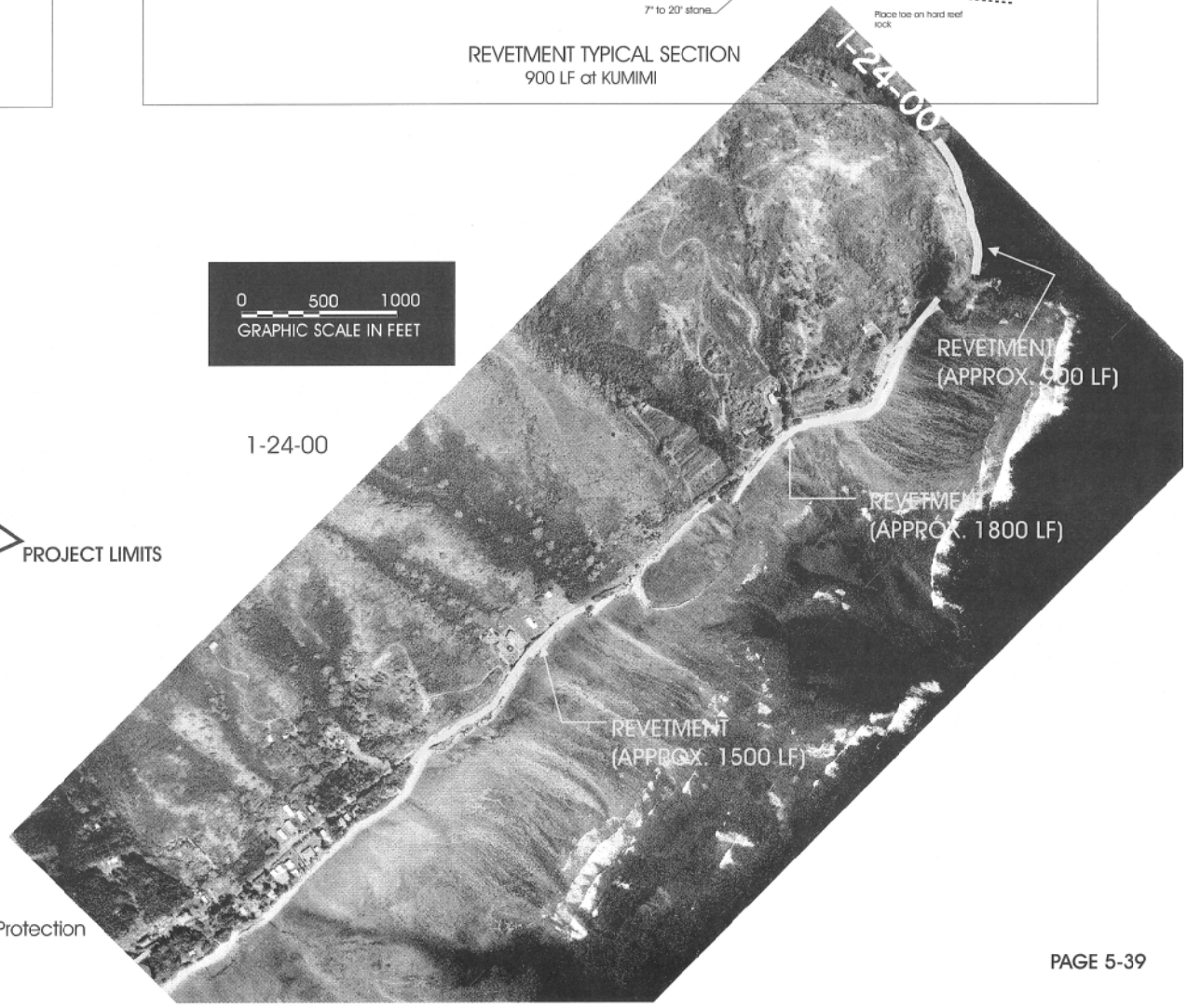
REVETMENT TYPICAL SECTION
900 LF at KUMIMI

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 1,155,600
ENGINEERING & DESIGN: $ 1,155,600
CONSTRUCTION COST: $ 9,788,200

TOTAL COST FOR ALTERNATIVE: $12,099,400

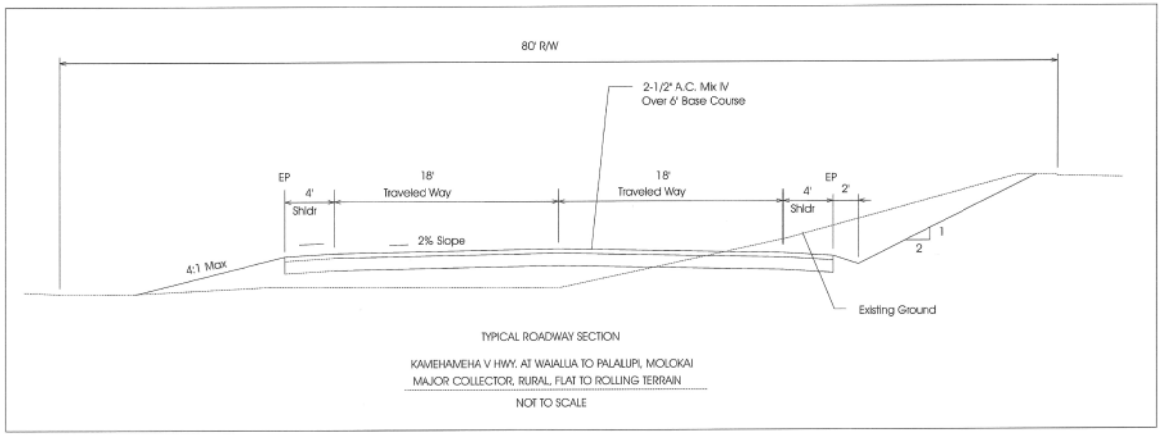


PROJECT LIMITS



ALTERNATE PLAN - REVETMENT
WAIALUA - KUMIMI, MOLOKAI

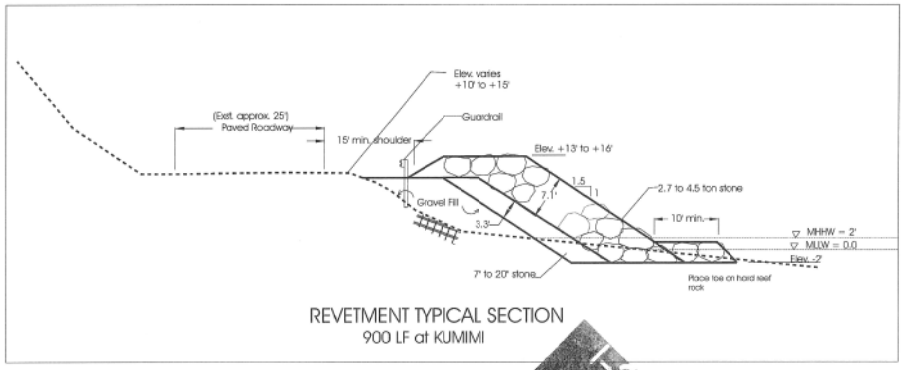
Statewide Highway Shoreline Protection
Project number HWY-08-98



TYPICAL ROADWAY SECTION

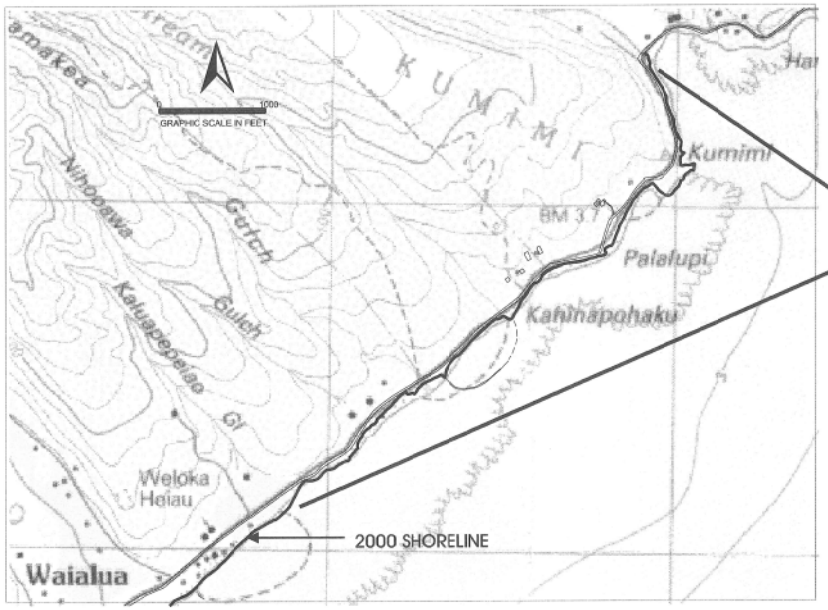
KAMEHAMEHA V HWY. AT WAIALUA TO PALALUPI, MOLOKAI
MAJOR COLLECTOR, RURAL, FLAT TO ROLLING TERRAIN

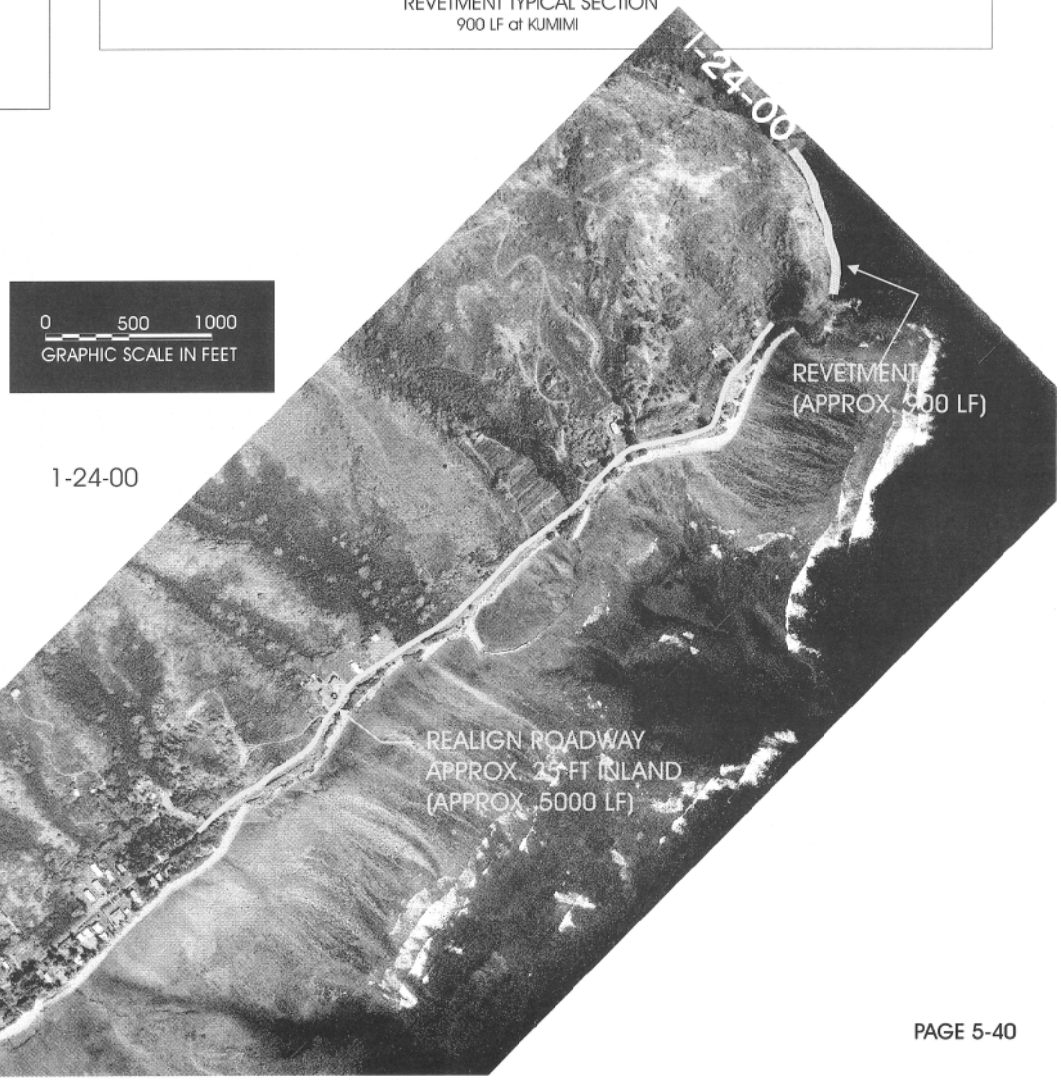
NOT TO SCALE



REVETMENT TYPICAL SECTION
900 LF at KUMIMI

REAL ESTATE (R/W ACQUISITION & RELOCATION COST):	$ 2,500,000
PLANNING & PERMITTING:	$ 1,697,400
ENGINEERING & DESIGN:	$ 1,697,400
CONSTRUCTION COST:	$14,377,000
TOTAL COST FOR ALTERNATIVE:	$20,271,800

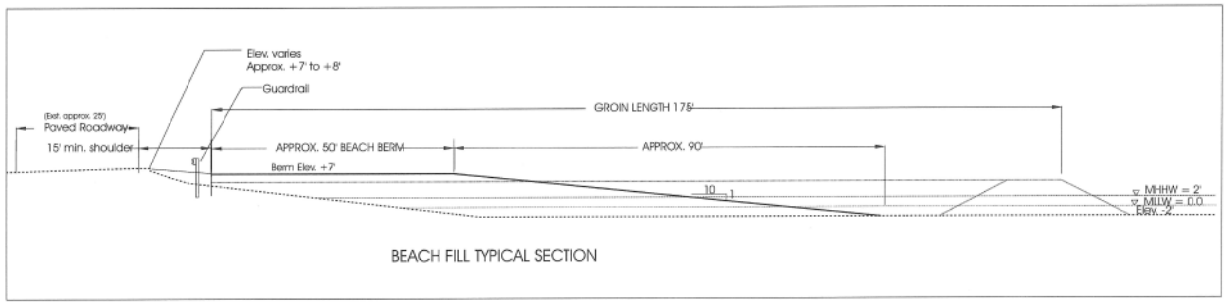




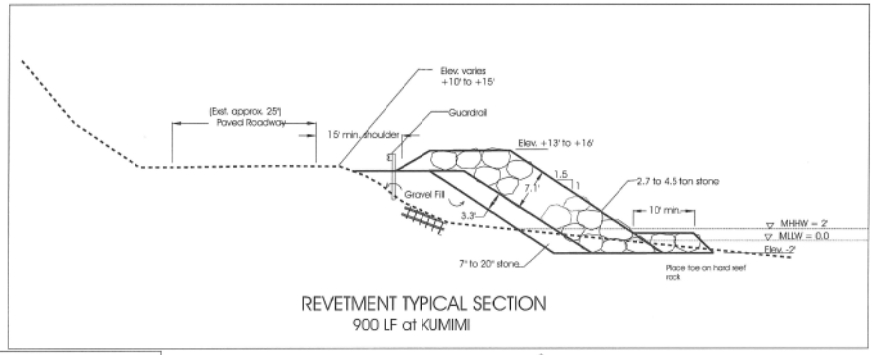
1-24-00

ALTERNATE PLAN - RELOCATE HWY + REVETMENT
WAIALUA - KUMIMI, MOLOKAI

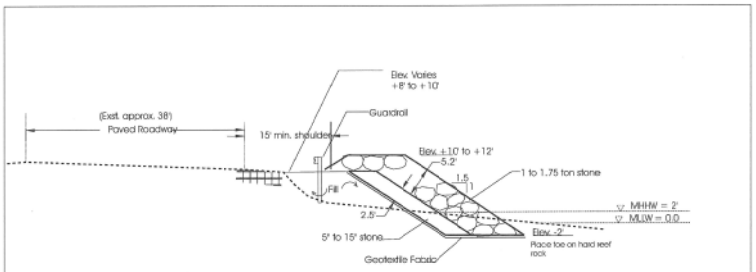
Statewide Highway Shoreline Protection
Project number HWY-08-98



BEACH FILL TYPICAL SECTION



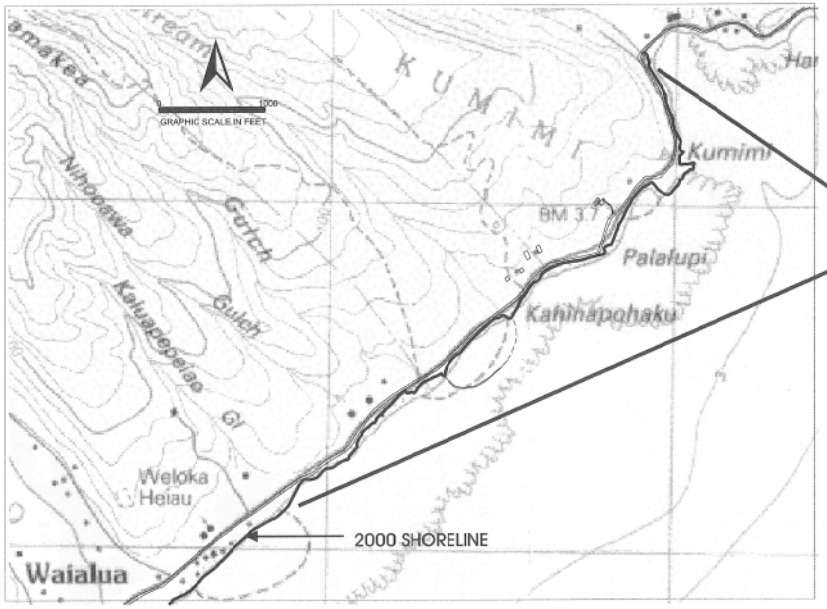
REVETMENT TYPICAL SECTION
900 LF at KUMIMI



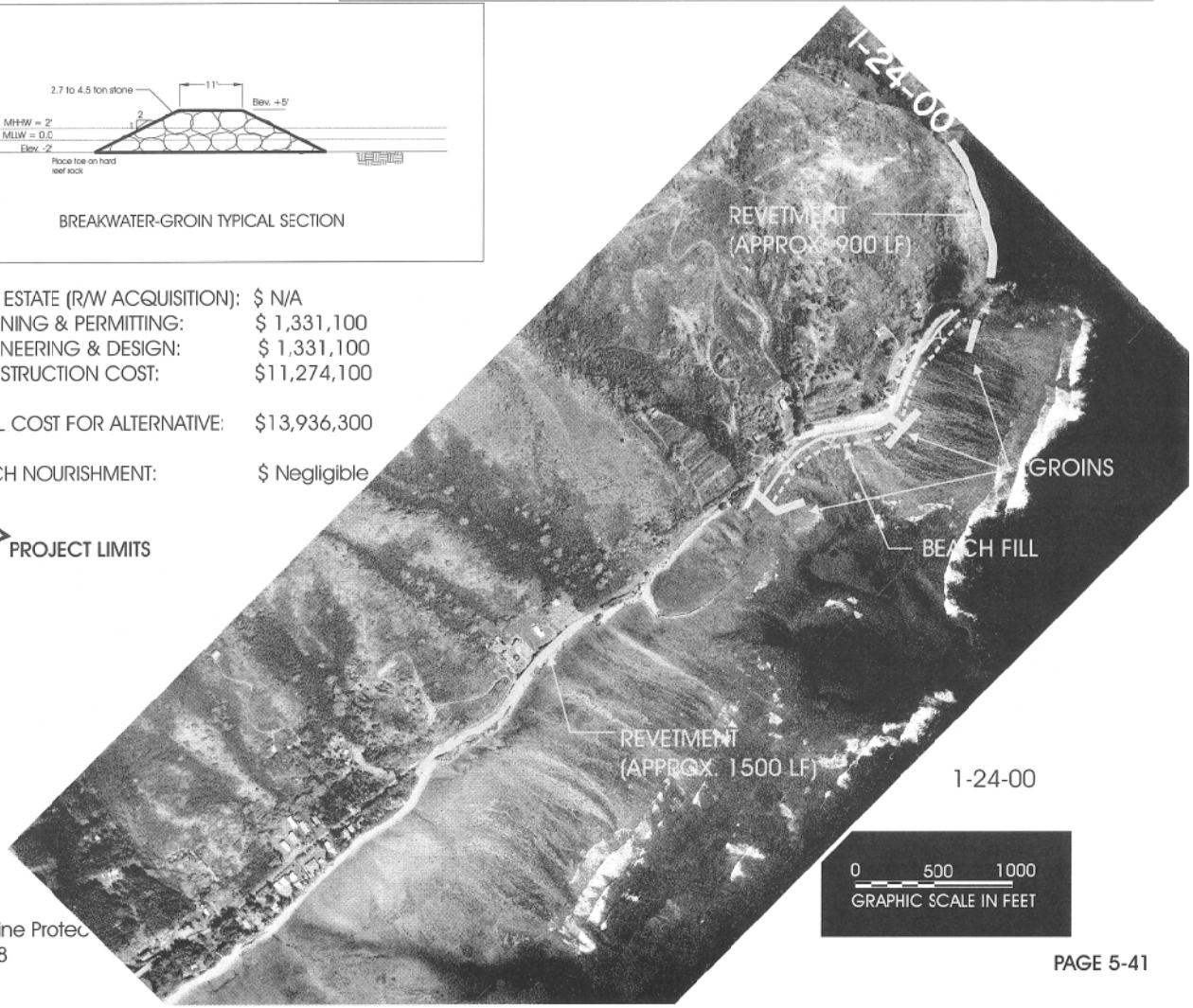
REVETMENT TYPICAL SECTION
1500 LF at WAIALUA

BREAKWATER-GROIN TYPICAL SECTION

REAL ESTATE (R/W ACQUISITION):	$ N/A
PLANNING & PERMITTING:	$ 1,331,100
ENGINEERING & DESIGN:	$ 1,331,100
CONSTRUCTION COST:	$11,274,100
TOTAL COST FOR ALTERNATIVE:	$13,936,300
BEACH NOURISHMENT:	$ Negligible

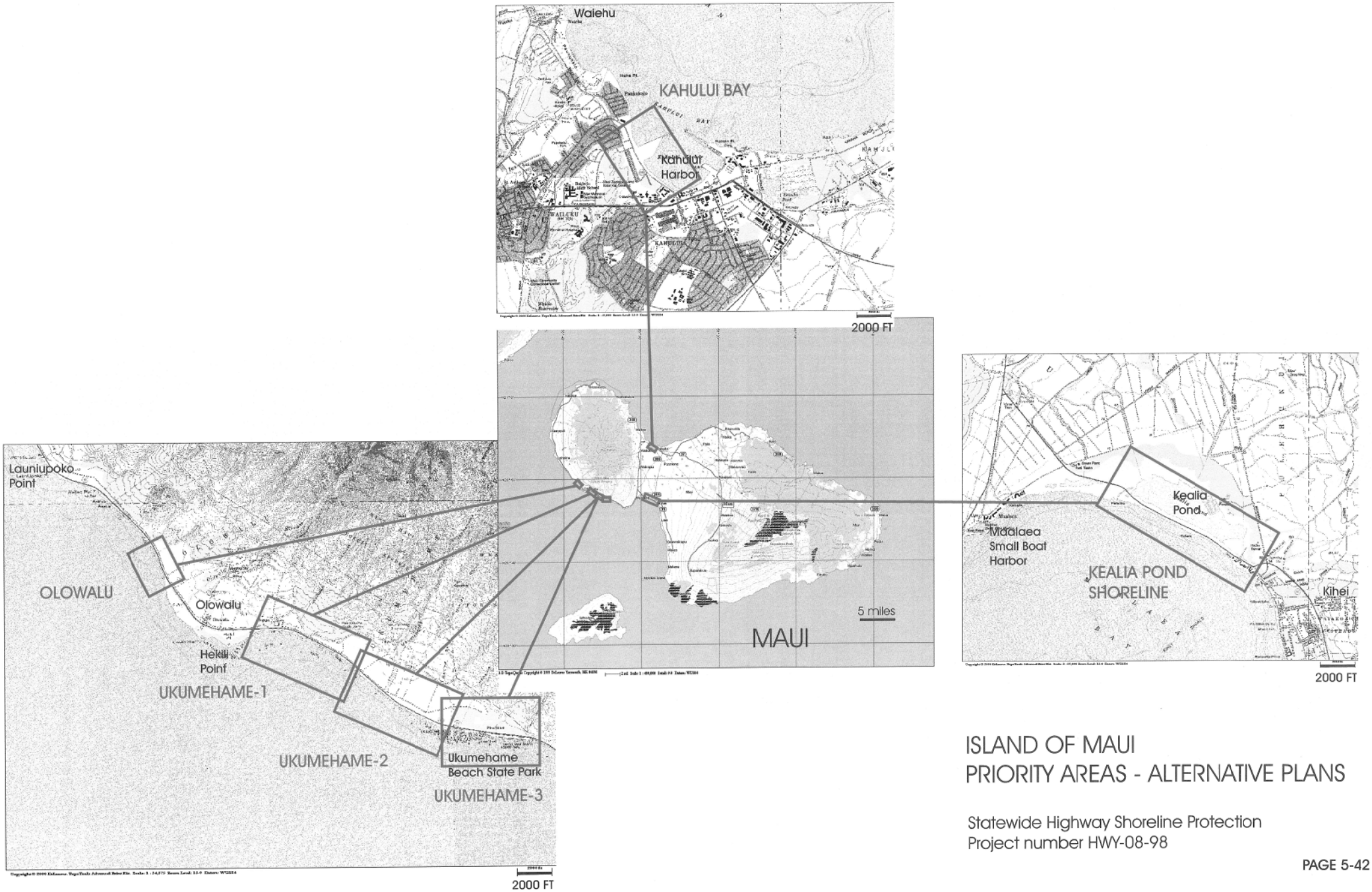


PROJECT LIMITS



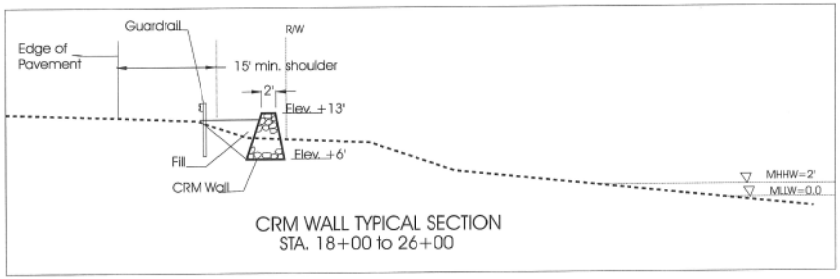
ALTERNATE PLAN - REVETMENT + BEACH
WAIALUA - KUMIMI, MOLOKAI

Statewide Highway Shoreline Protec
Project number HWY-08-98

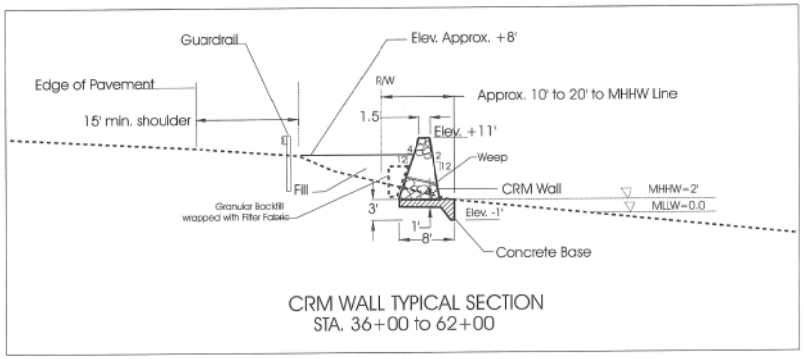


ISLAND OF MAUI
PRIORITY AREAS - ALTERNATIVE PLANS

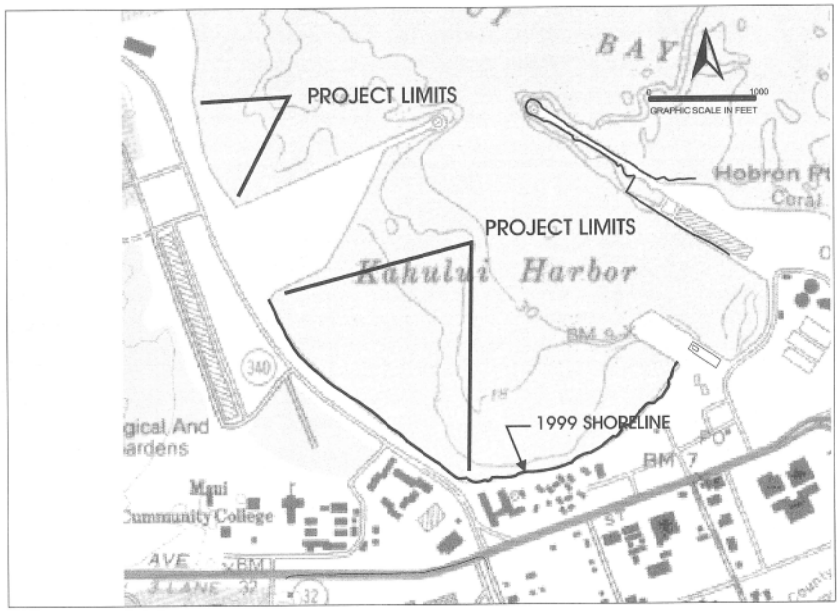
Statewide Highway Shoreline Protection
Project number HWY-08-98



CRM WALL TYPICAL SECTION
STA. 18+00 to 26+00

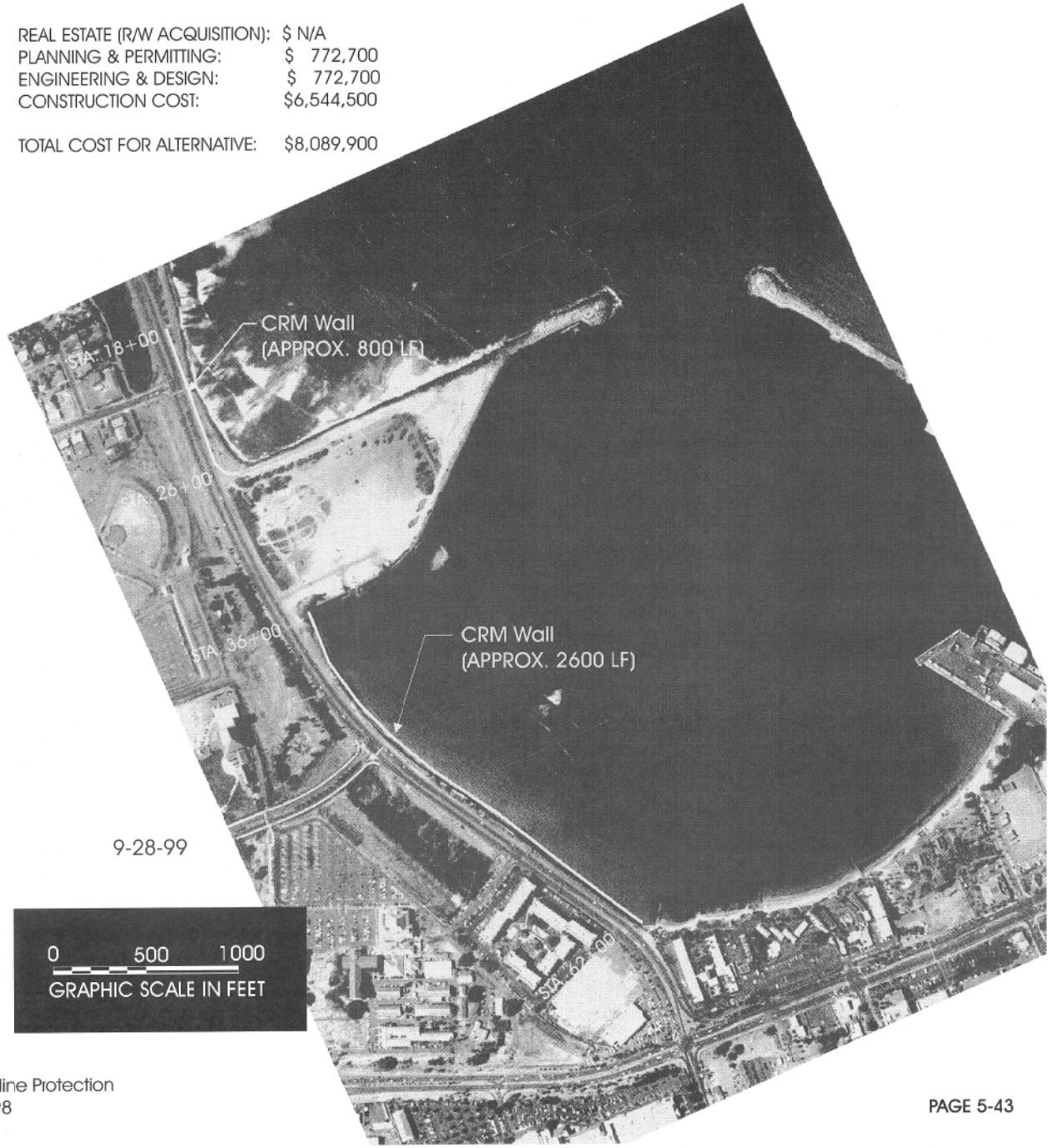


CRM WALL TYPICAL SECTION
STA. 36+00 to 62+00



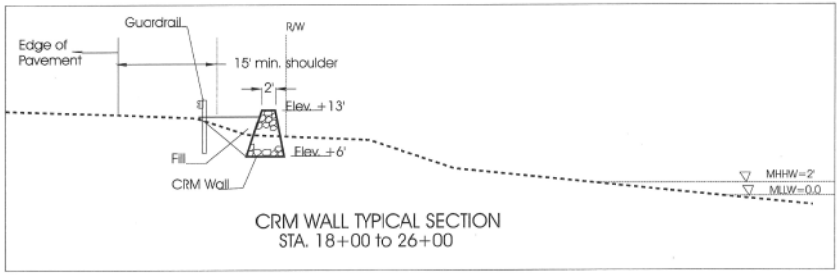
REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 772,700
ENGINEERING & DESIGN: $ 772,700
CONSTRUCTION COST: $6,544,500

TOTAL COST FOR ALTERNATIVE: $8,089,900

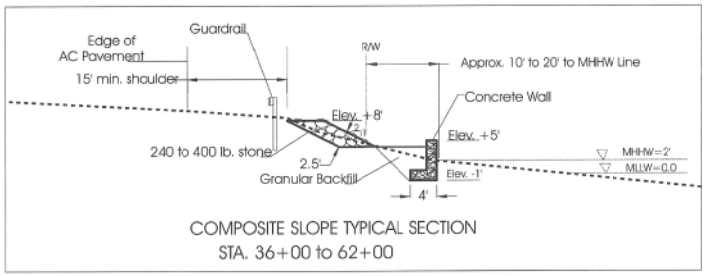


ALTERNATE PLAN - CRM WALL
KAHULUI BAY, MAUI

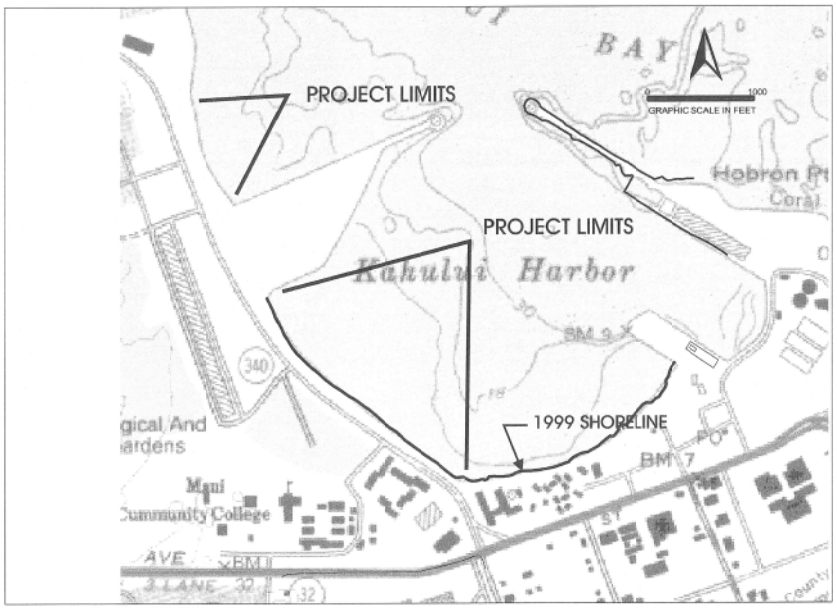
Statewide Highway Shoreline Protection
Project number HWY-08-98



CRM WALL TYPICAL SECTION
STA. 18+00 to 26+00



COMPOSITE SLOPE TYPICAL SECTION
STA. 36+00 to 62+00



REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 472,300
ENGINEERING & DESIGN: $ 472,300
CONSTRUCTION COST: $4,000,400

TOTAL COST FOR ALTERNATIVE: $4,945,000

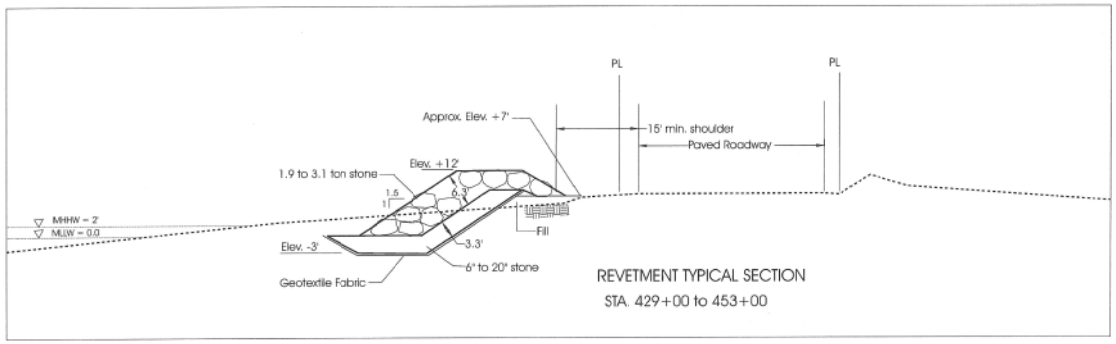


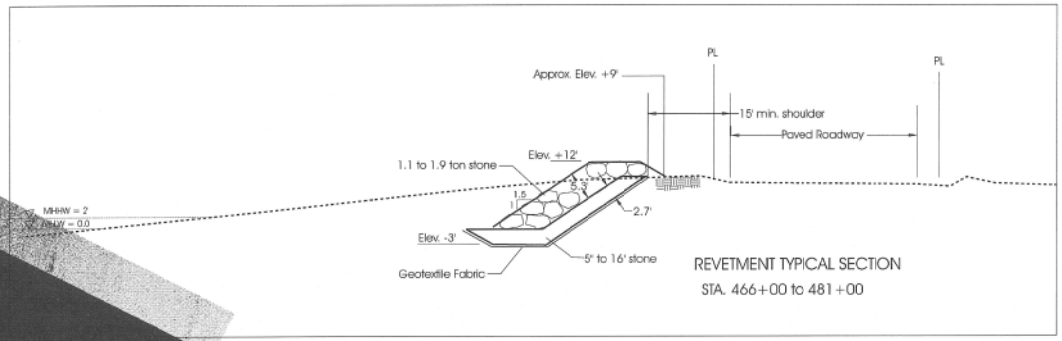
9-28-99

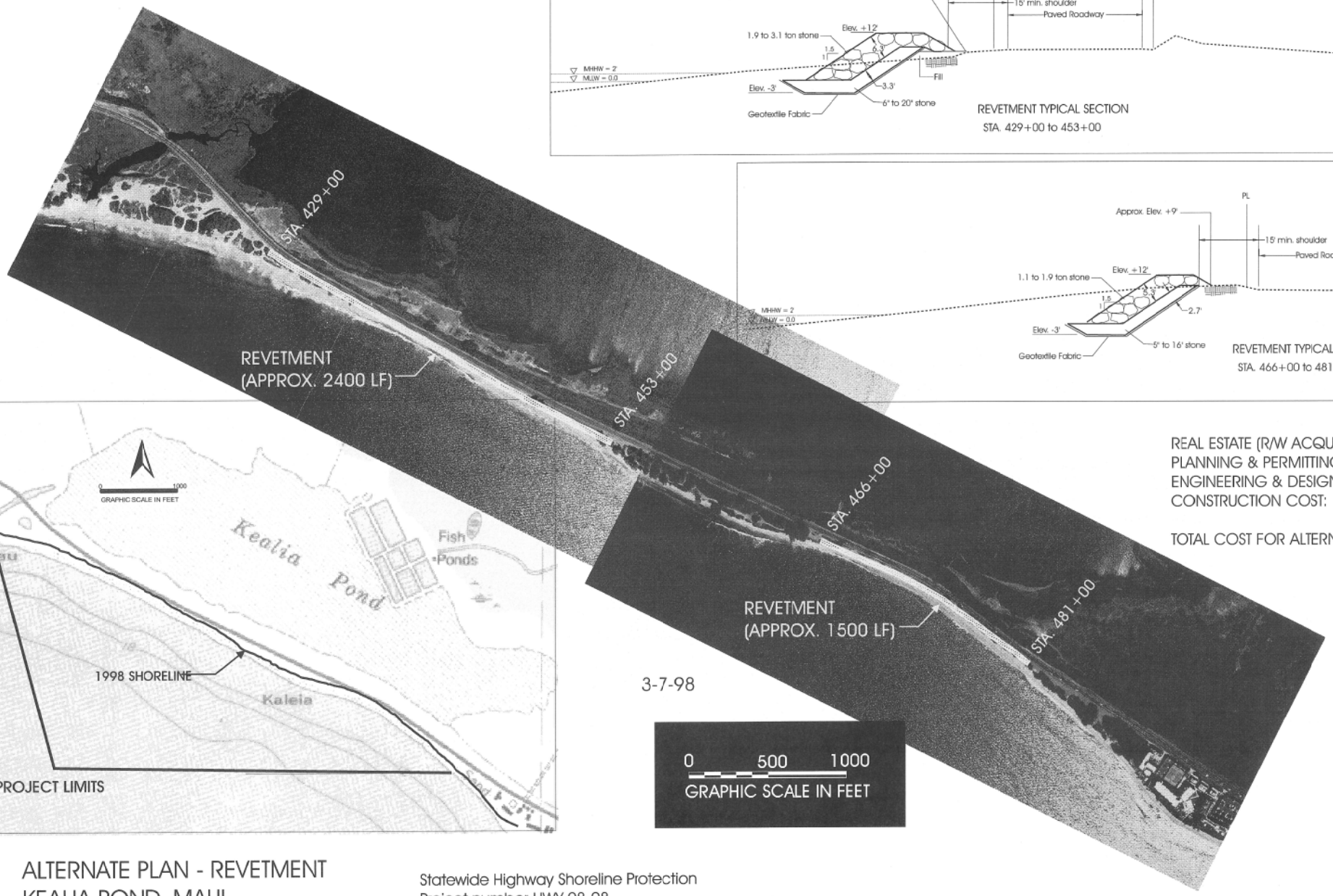
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GRAPHIC SCALE IN FEET

ALTERNATE PLAN - CRM WALL + COMPOSITE SLOPE PROTECTION
KAHULUI BAY, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98







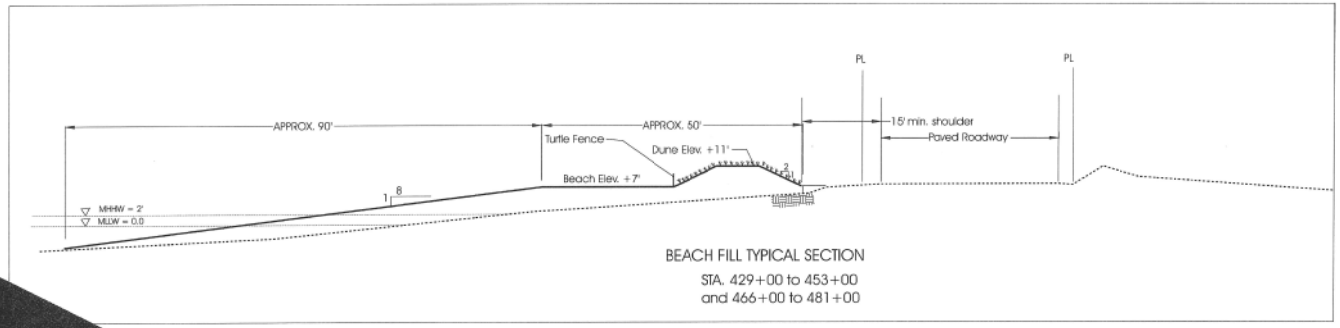
3-7-98

0 500 1000
GRAPHIC SCALE IN FEET

REAL ESTATE (R/W ACQUISITION):	$ N/A
PLANNING & PERMITTING:	$ 1,151,100
ENGINEERING & DESIGN:	$ 1,151,100
CONSTRUCTION COST:	$ 9,750,000
TOTAL COST FOR ALTERNATIVE:	$12,052,200

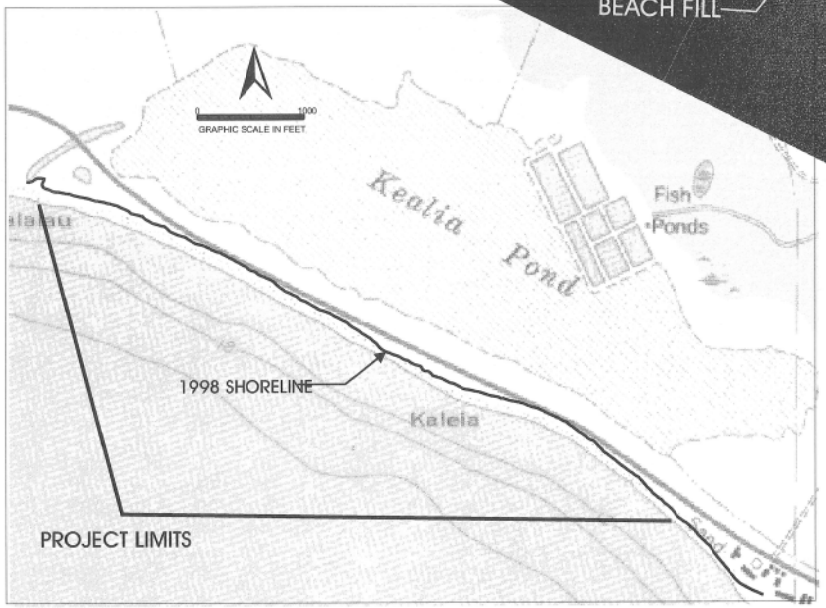
ALTERNATE PLAN - REVETMENT
KEALIA POND, MAUI

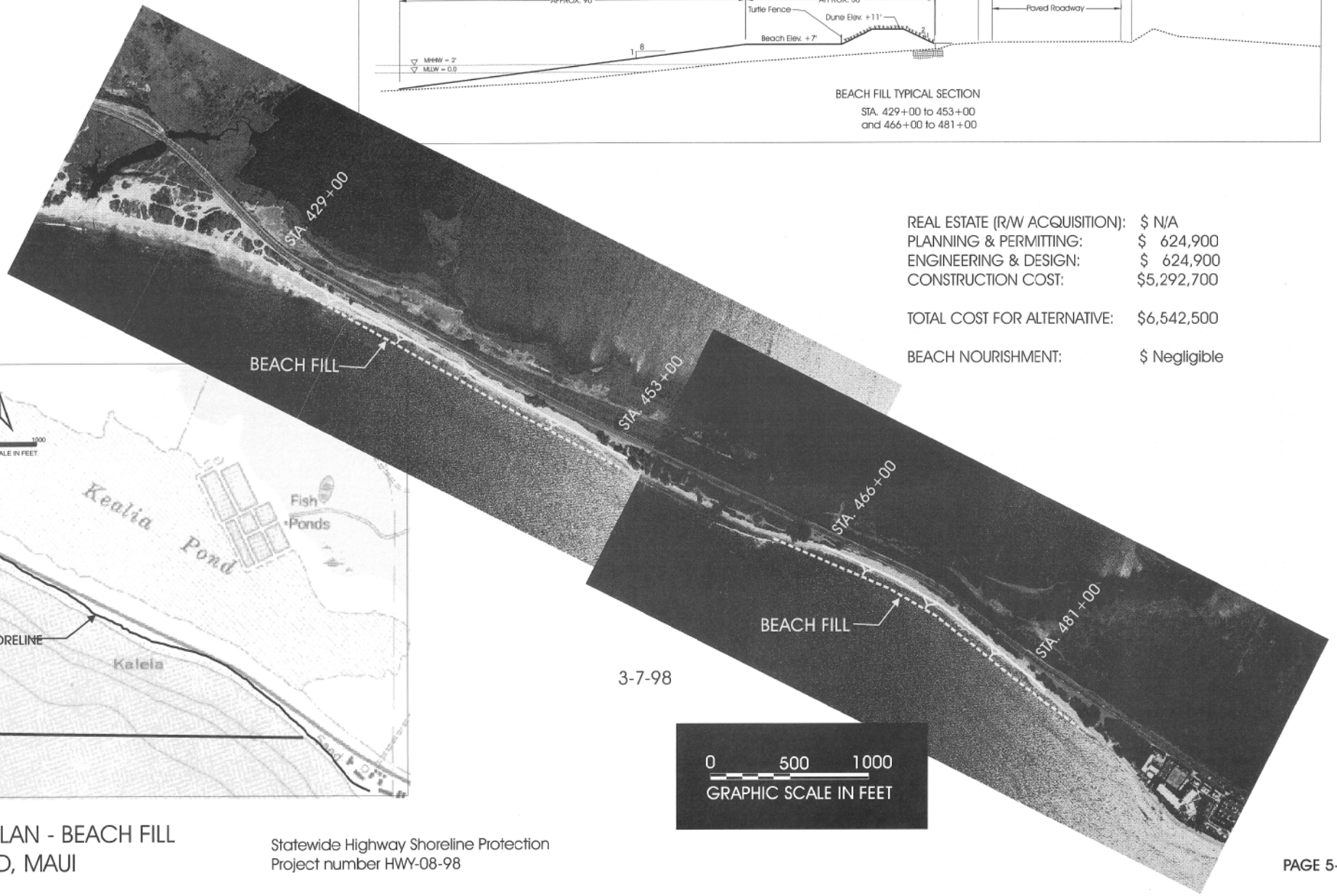
Statewide Highway Shoreline Protection
Project number HWY-08-98



BEACH FILL TYPICAL SECTION
STA. 429+00 to 453+00
and 466+00 to 481+00

REAL ESTATE (R/W ACQUISITION):	$ N/A
PLANNING & PERMITTING:	$ 624,900
ENGINEERING & DESIGN:	$ 624,900
CONSTRUCTION COST:	$5,292,700
TOTAL COST FOR ALTERNATIVE:	$6,542,500
BEACH NOURISHMENT:	$ Negligible

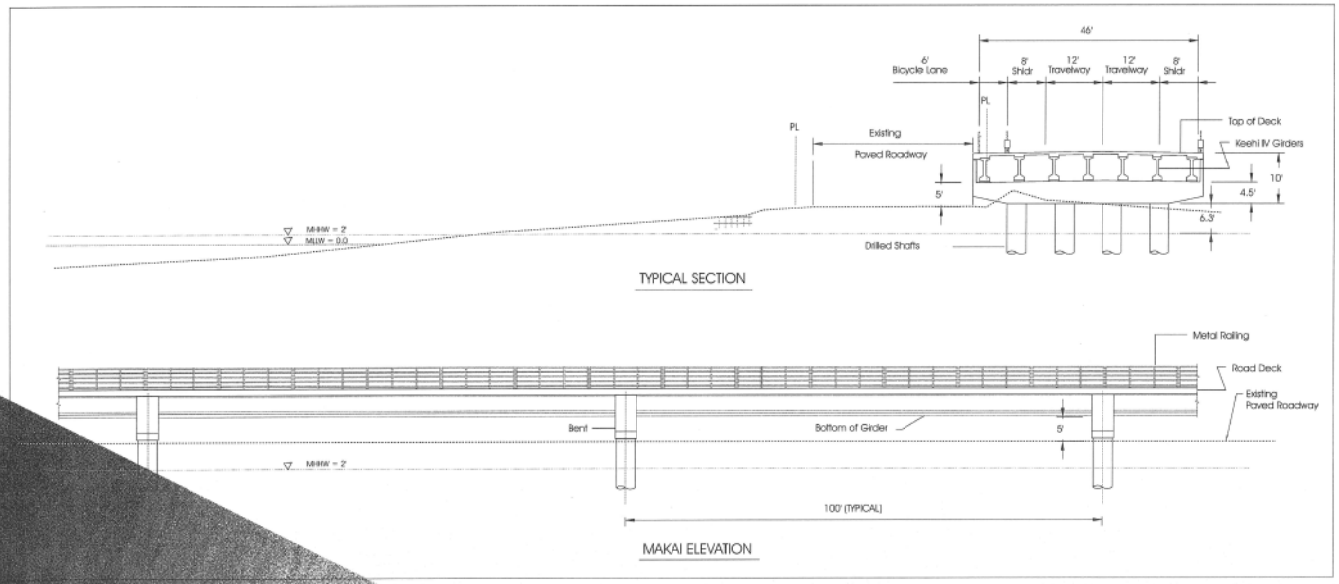


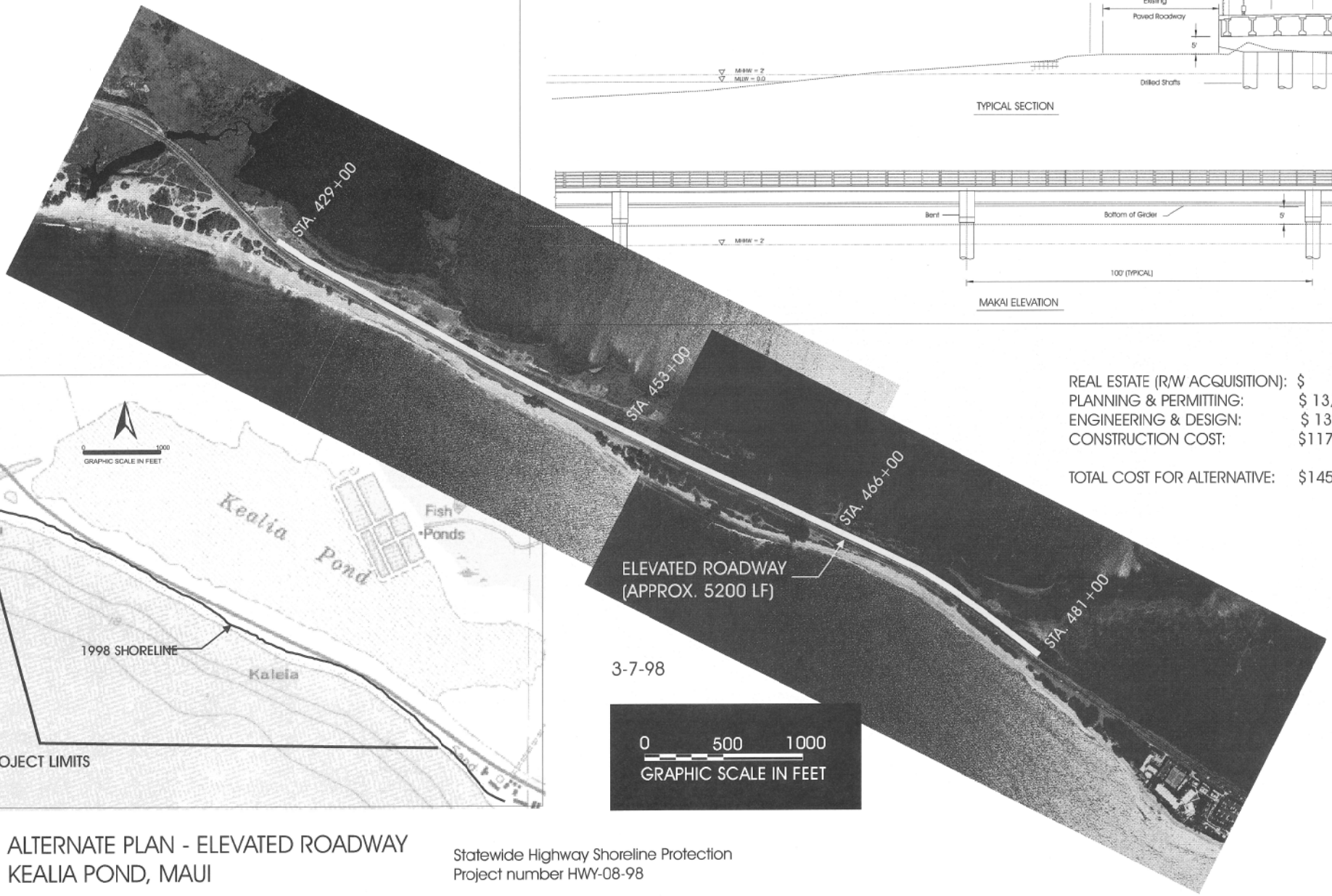


3-7-98

ALTERNATE PLAN - BEACH FILL
KEALIA POND, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98





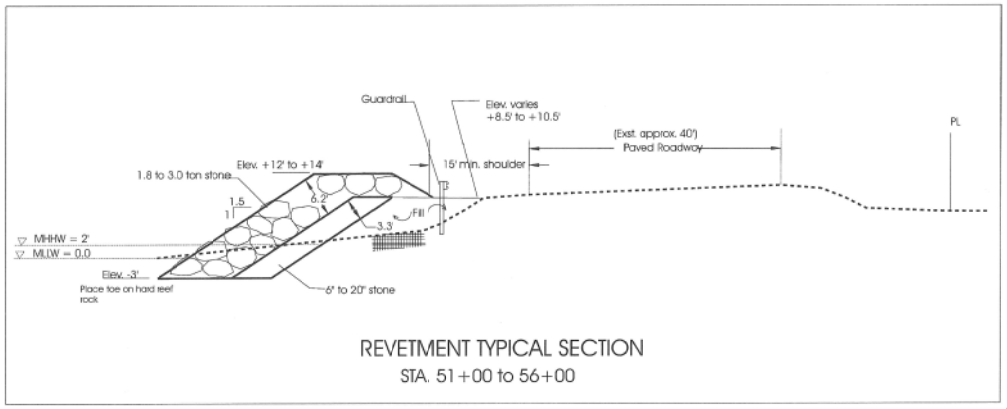
REAL ESTATE (R/W ACQUISITION):	$ 150,000
PLANNING & PERMITTING:	$ 13,888,300
ENGINEERING & DESIGN:	$ 13,888,300
CONSTRUCTION COST:	$117,633,800
TOTAL COST FOR ALTERNATIVE:	$145,560,400

3-7-98

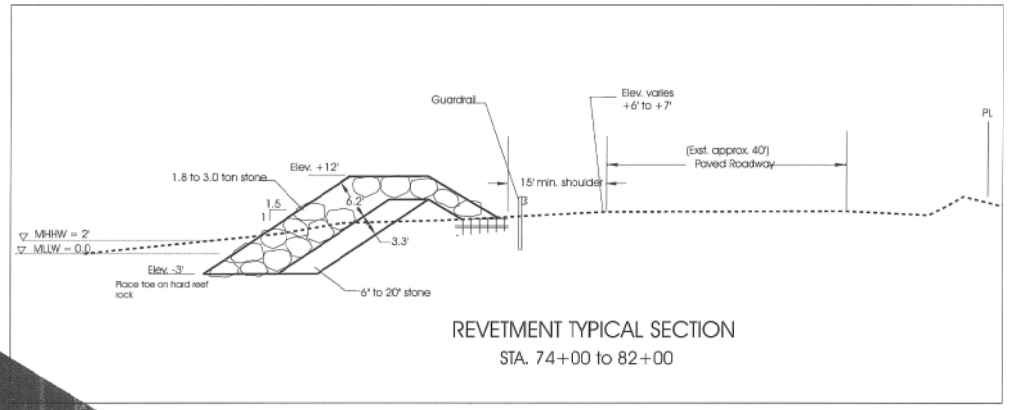
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GRAPHIC SCALE IN FEET

ALTERNATE PLAN - ELEVATED ROADWAY
KEALIA POND, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98



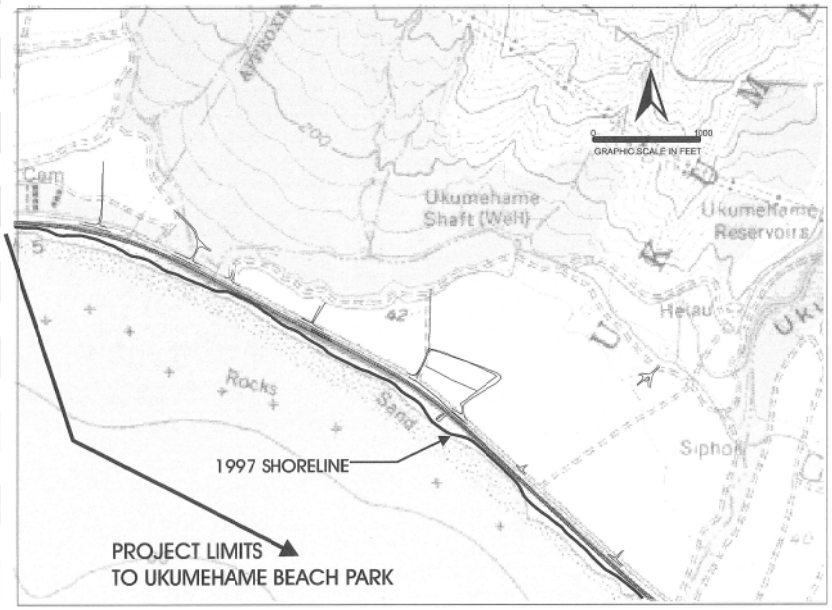
REVETMENT TYPICAL SECTION
STA. 51+00 to 56+00

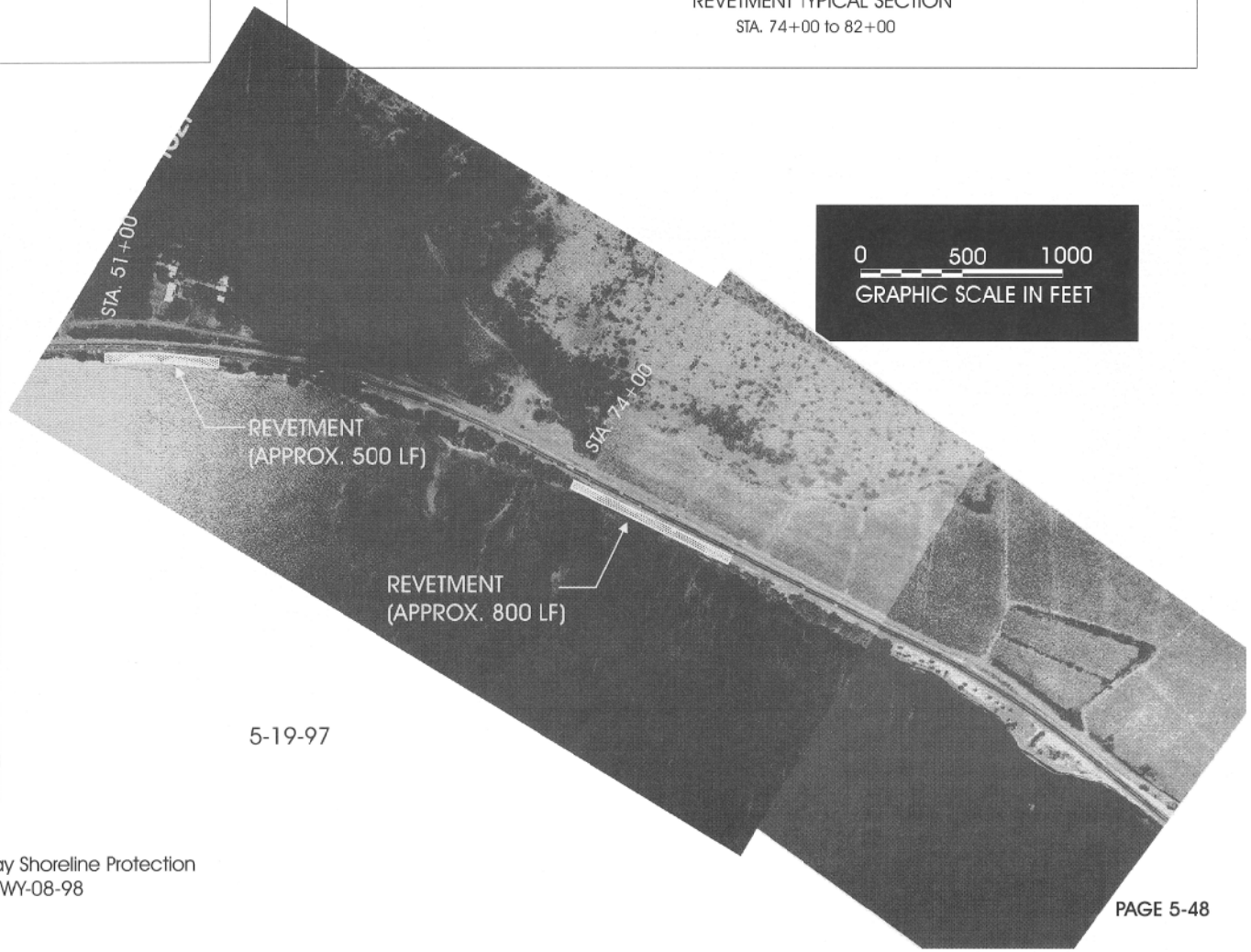


REVETMENT TYPICAL SECTION
STA. 74+00 to 82+00

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 404,700
ENGINEERING & DESIGN: $ 404,700
CONSTRUCTION COST: $3,427,800

TOTAL COST FOR ALTERNATIVE: $4,237,200





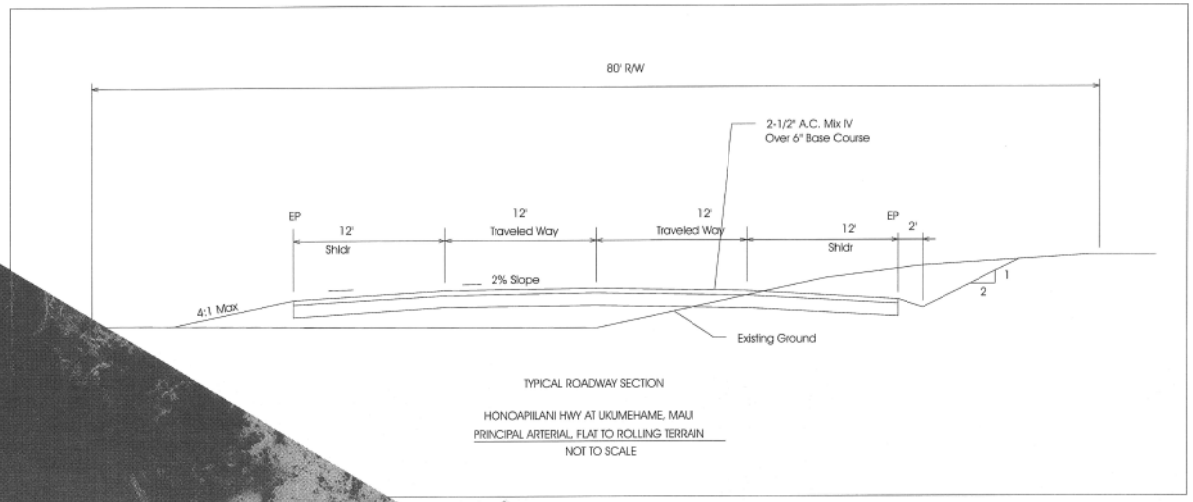
5-19-97

ALTERNATE PLAN - REVETMENT
UKUMEHAME-1, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98

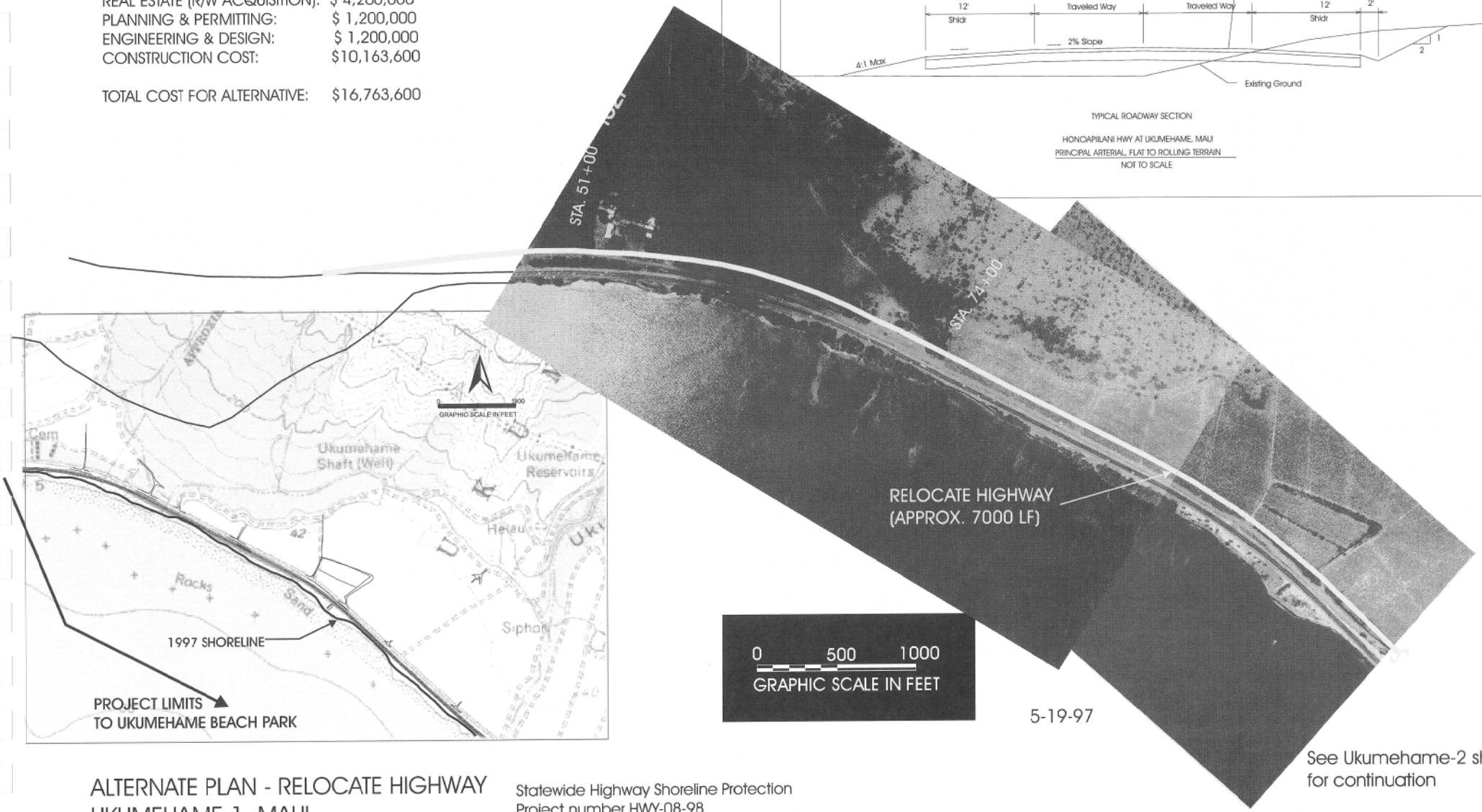
REAL ESTATE (R/W ACQUISITION): $ 4,200,000
PLANNING & PERMITTING: $ 1,200,000
ENGINEERING & DESIGN: $ 1,200,000
CONSTRUCTION COST: $10,163,600

TOTAL COST FOR ALTERNATIVE: $16,763,600



TYPICAL ROADWAY SECTION

HONOAPIILANI HWY AT UKUMEHAME, MAUI
PRINCIPAL ARTERIAL, FLAT TO ROLLING TERRAIN
NOT TO SCALE

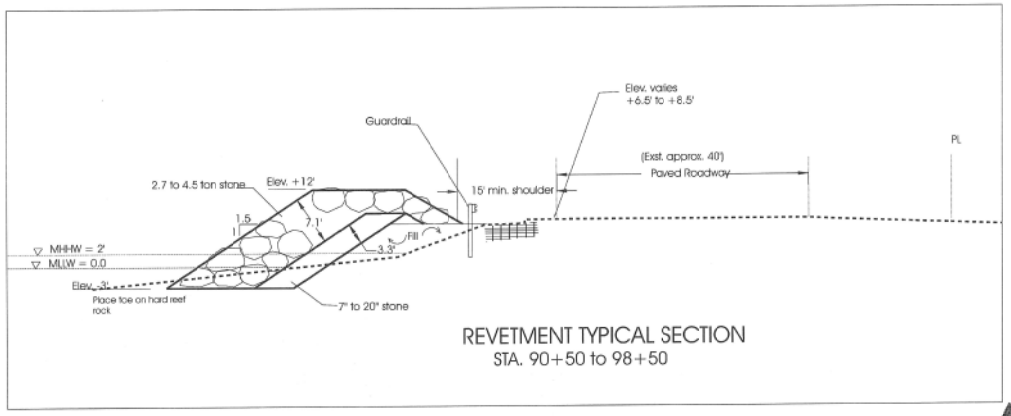


5-19-97

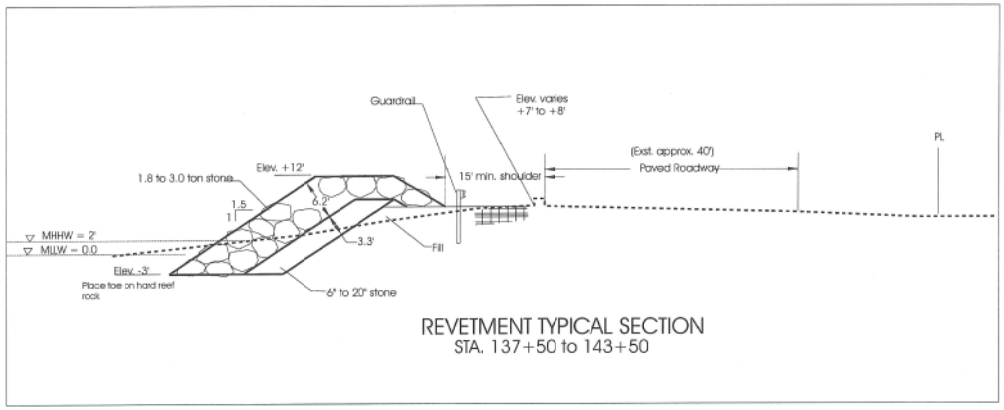
See Ukumehame-2 sheet
for continuation

ALTERNATE PLAN - RELOCATE HIGHWAY
UKUMEHAME-1, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98



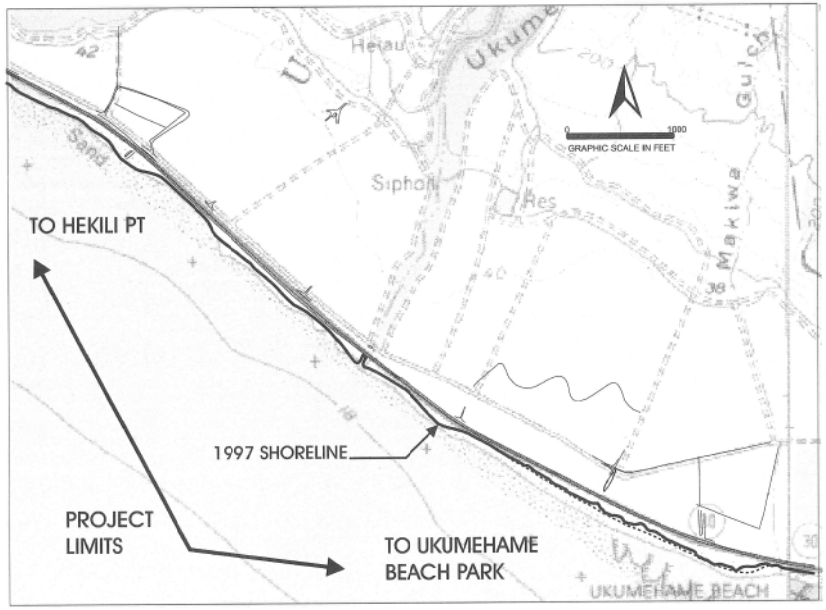
REVETMENT TYPICAL SECTION
STA. 90+50 to 98+50

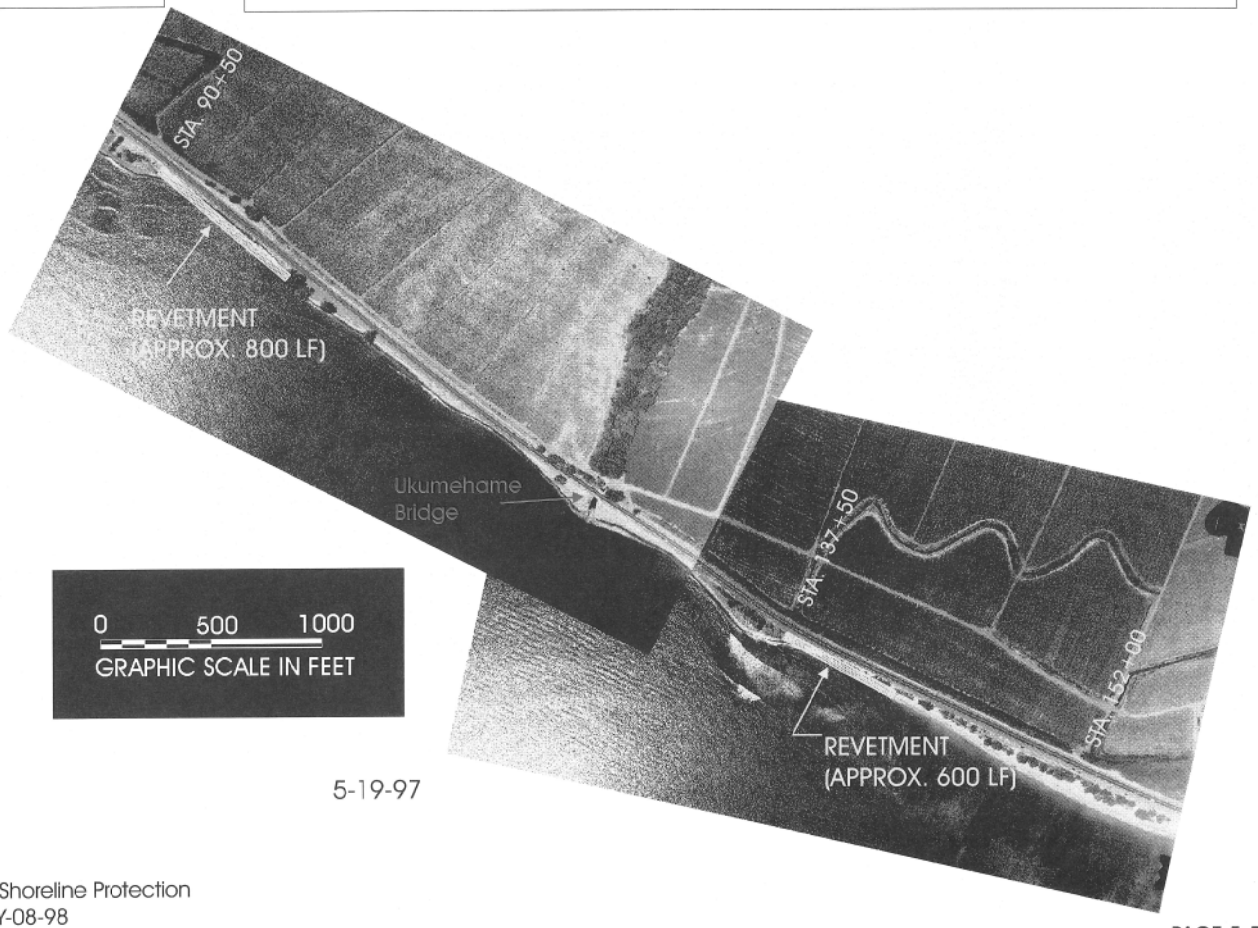


REVETMENT TYPICAL SECTION
STA. 137+50 to 143+50

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 457,500
ENGINEERING & DESIGN: $ 457,500
CONSTRUCTION COST: $3,875,000

TOTAL COST FOR ALTERNATIVE: $4,790,000





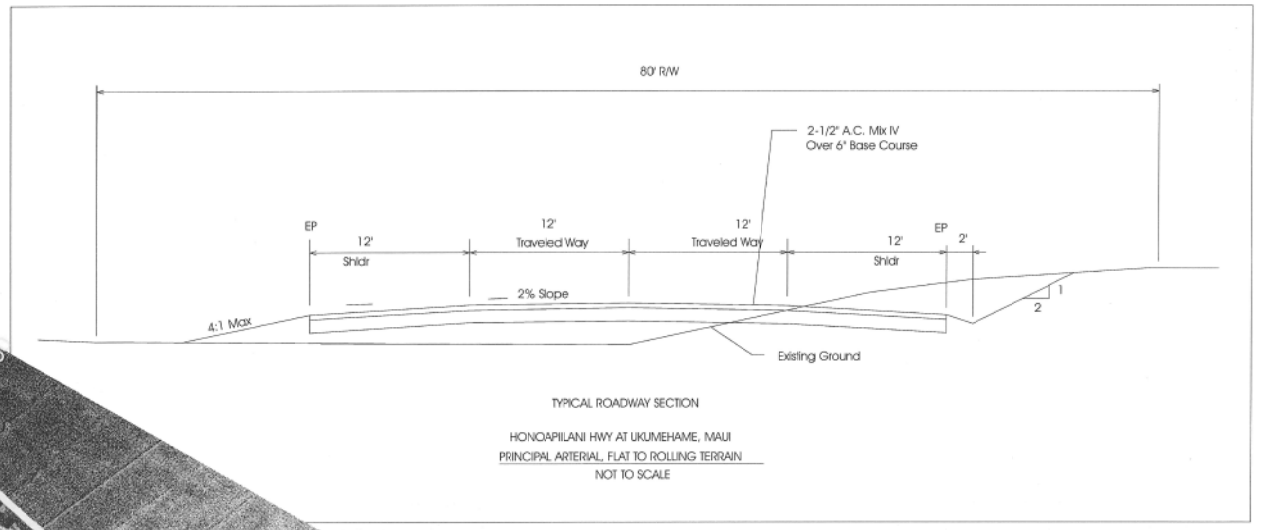
5-19-97

ALTERNATE PLAN - REVETMENT
UKUMEHAME-2, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98

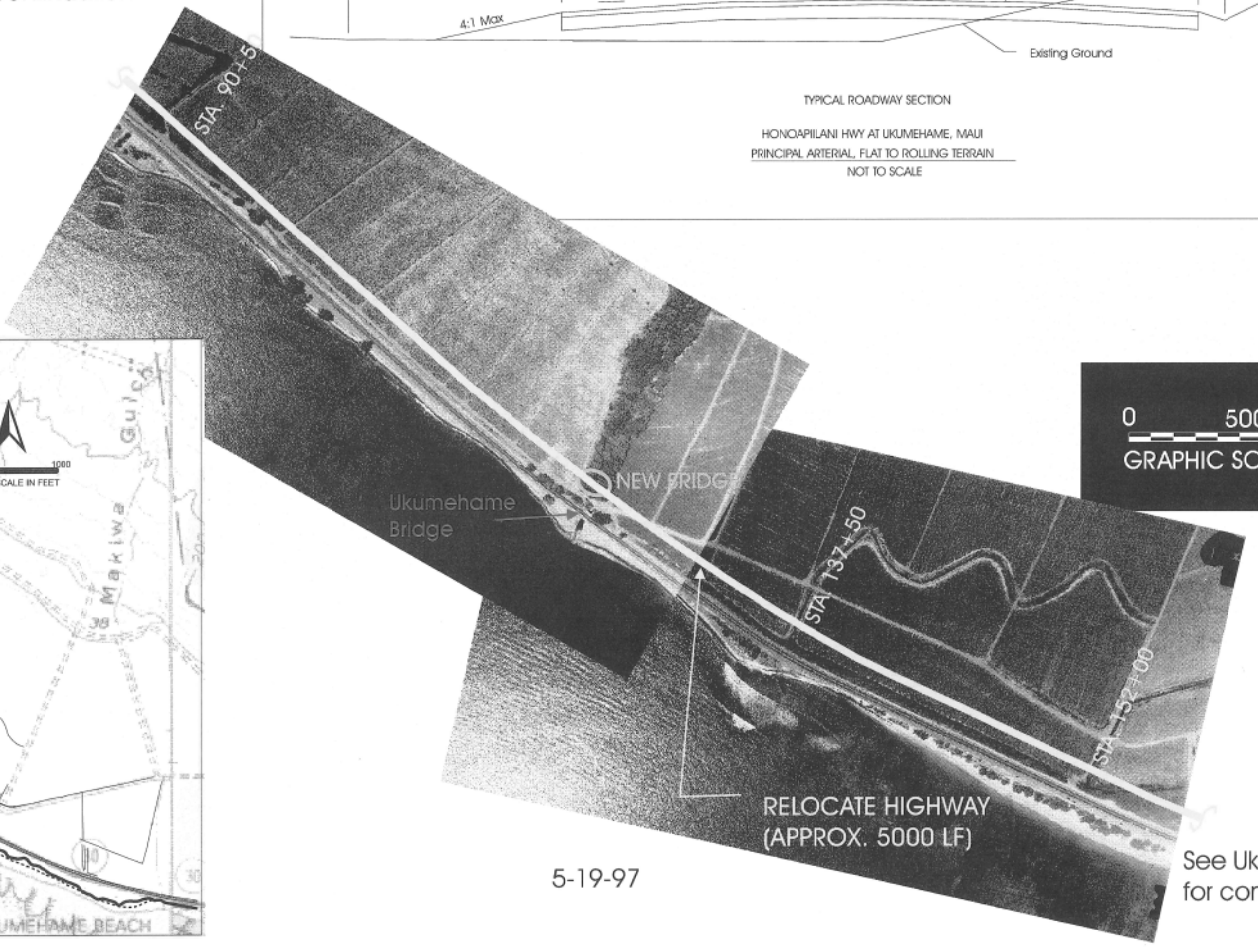
REAL ESTATE (R/W ACQUISITION):	$ 2,900,000
PLANNING & PERMITTING:	$ 828,500
ENGINEERING & DESIGN:	$ 828,500
CONSTRUCTION COST:	$ 7,017,700
TOTAL COST FOR ALTERNATIVE:	$11,574,700

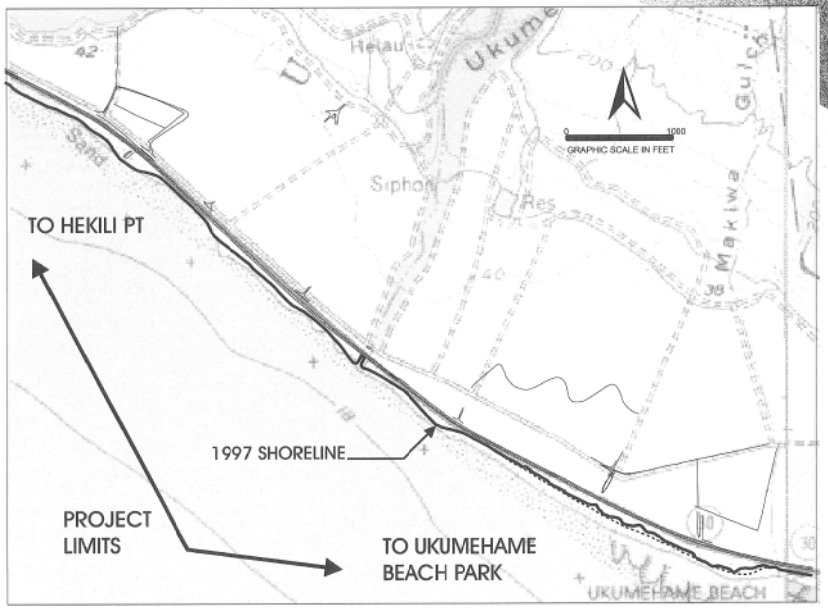
See Ukumehame-1 sheet for continuation



TYPICAL ROADWAY SECTION

HONOAPIILANI HWY AT UKUMEHAME, MAUI
PRINCIPAL ARTERIAL, FLAT TO ROLLING TERRAIN
NOT TO SCALE





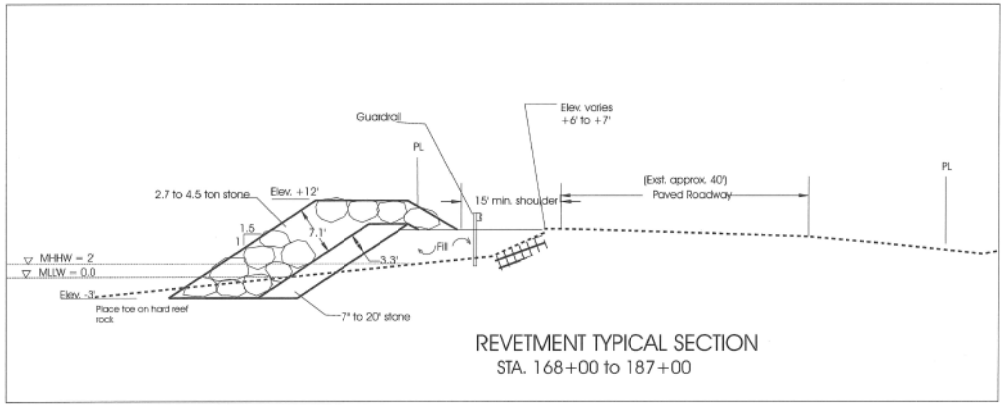
5-19-97

See Ukumehame-3 sheet for continuation

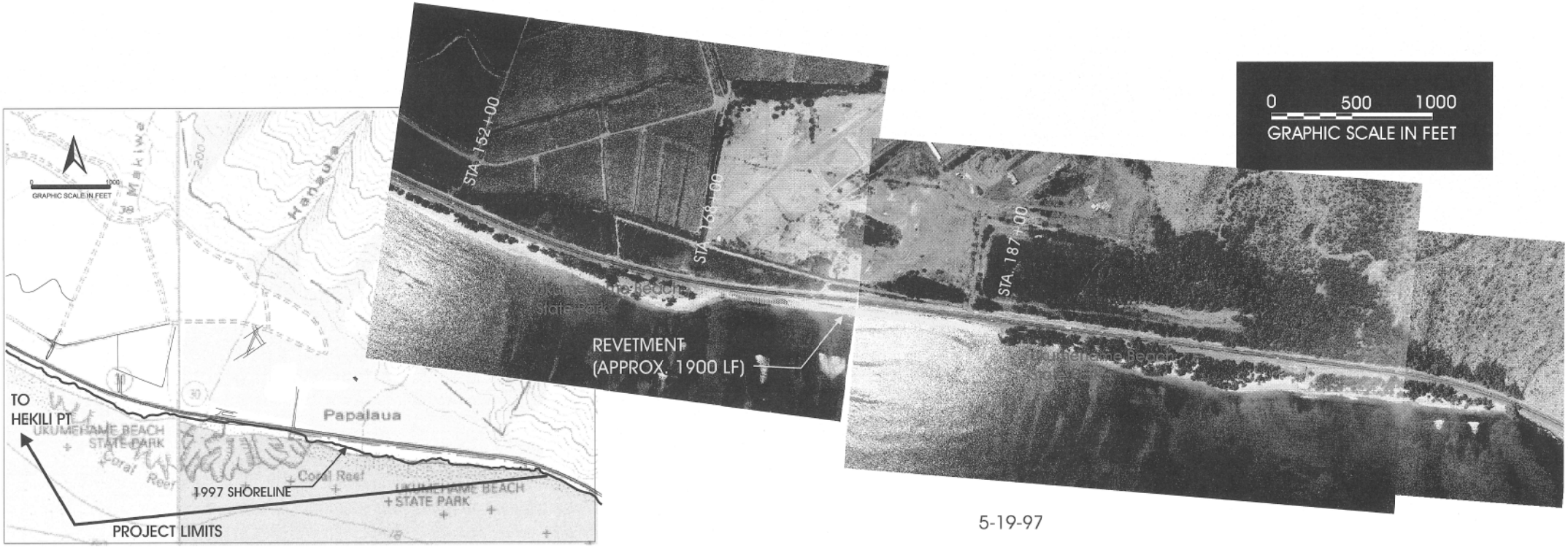
ALTERNATE PLAN - RELOCATE HIGHWAY
UKUMEHAME-2, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98

REAL ESTATE (R/W ACQUISITION):	$ N/A
PLANNING & PERMITTING:	$ 622,400
ENGINEERING & DESIGN:	$ 622,400
CONSTRUCTION COST:	$5,271,600
TOTAL COST FOR ALTERNATIVE:	$6,516,400



REVETMENT TYPICAL SECTION
STA. 168+00 to 187+00

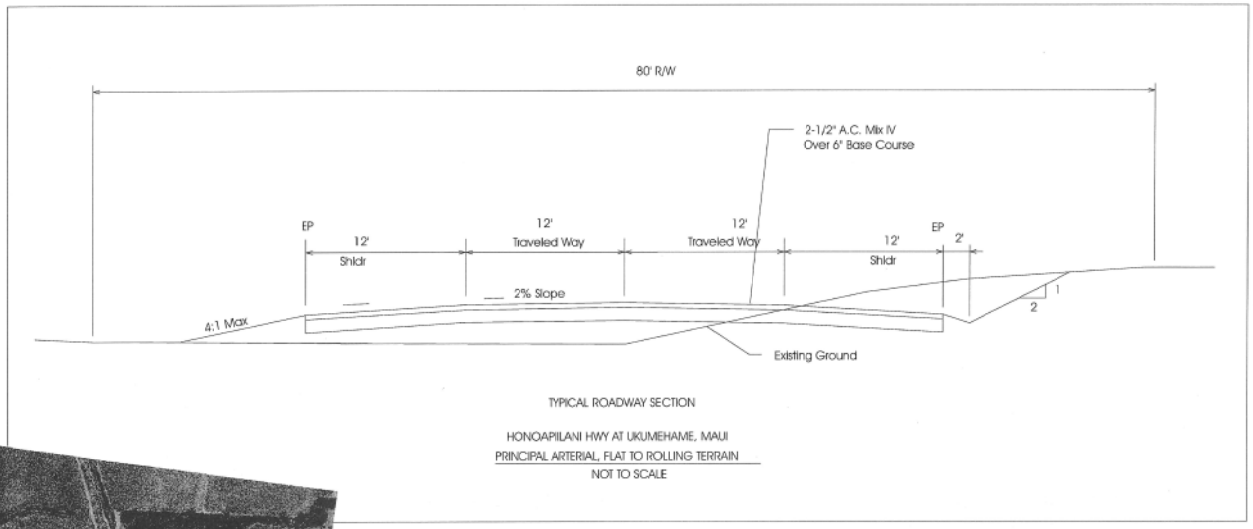


5-19-97

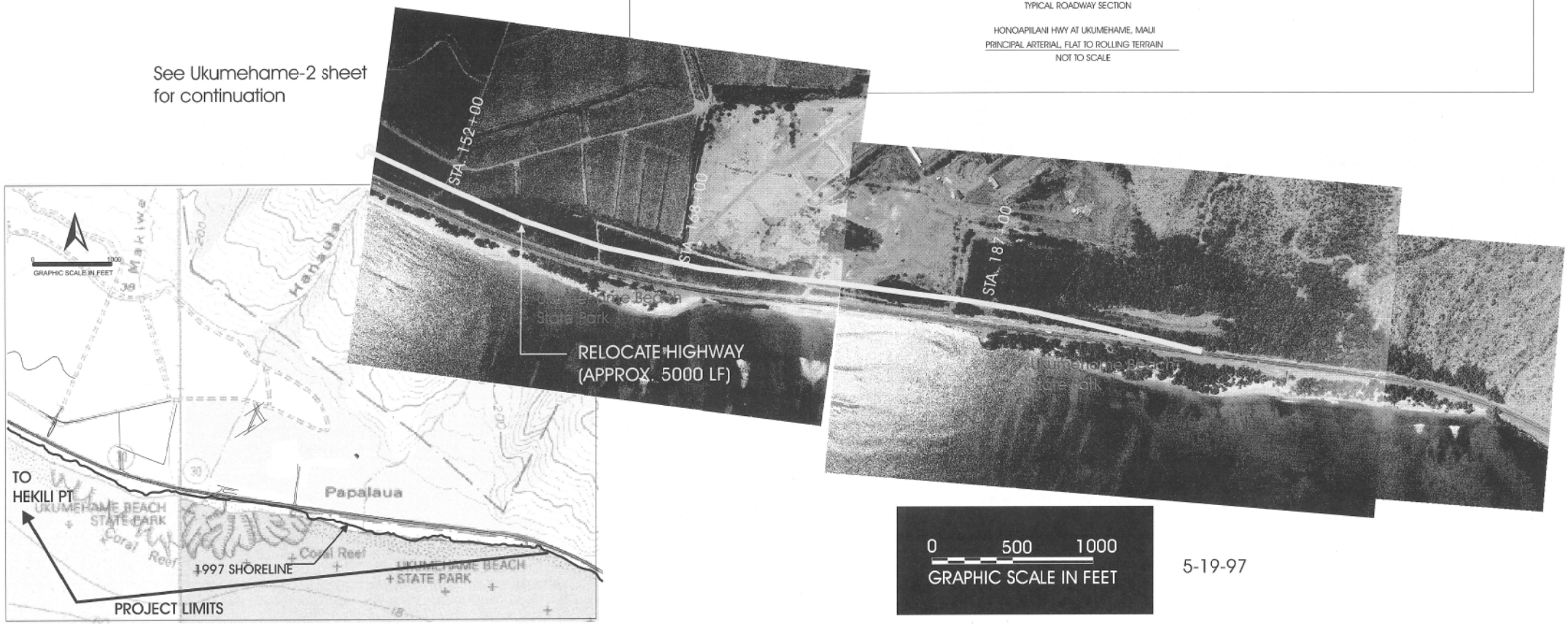
ALTERNATE PLAN - REVETMENT
UKUMEHAME-3, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98

REAL ESTATE (R/W ACQUISITION):	$ 2,900,000
PLANNING & PERMITTING:	$ 828,500
ENGINEERING & DESIGN:	$ 828,500
CONSTRUCTION COST:	$ 7,017,700
TOTAL COST FOR ALTERNATIVE:	$11,574,700



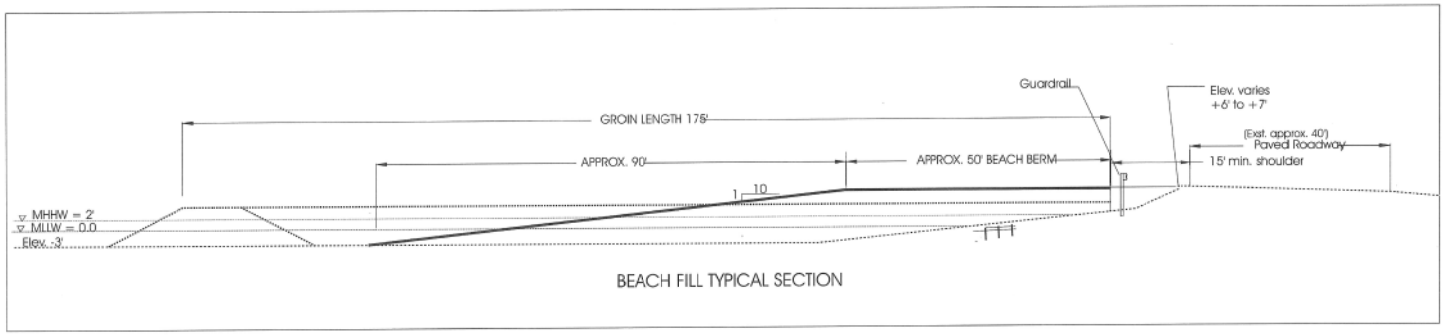
See Ukumehame-2 sheet
for continuation



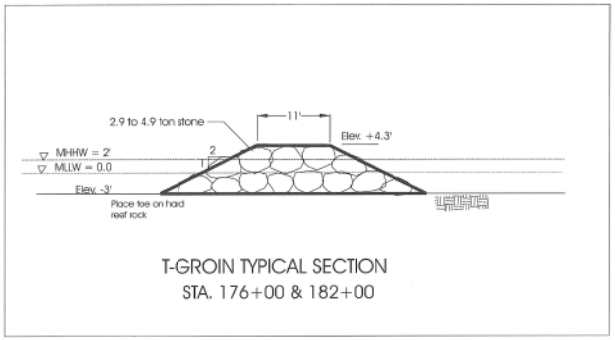
5-19-97

ALTERNATE PLAN - RELOCATE HIGHWAY
UKUMEHAME-3, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98



BEACH FILL TYPICAL SECTION

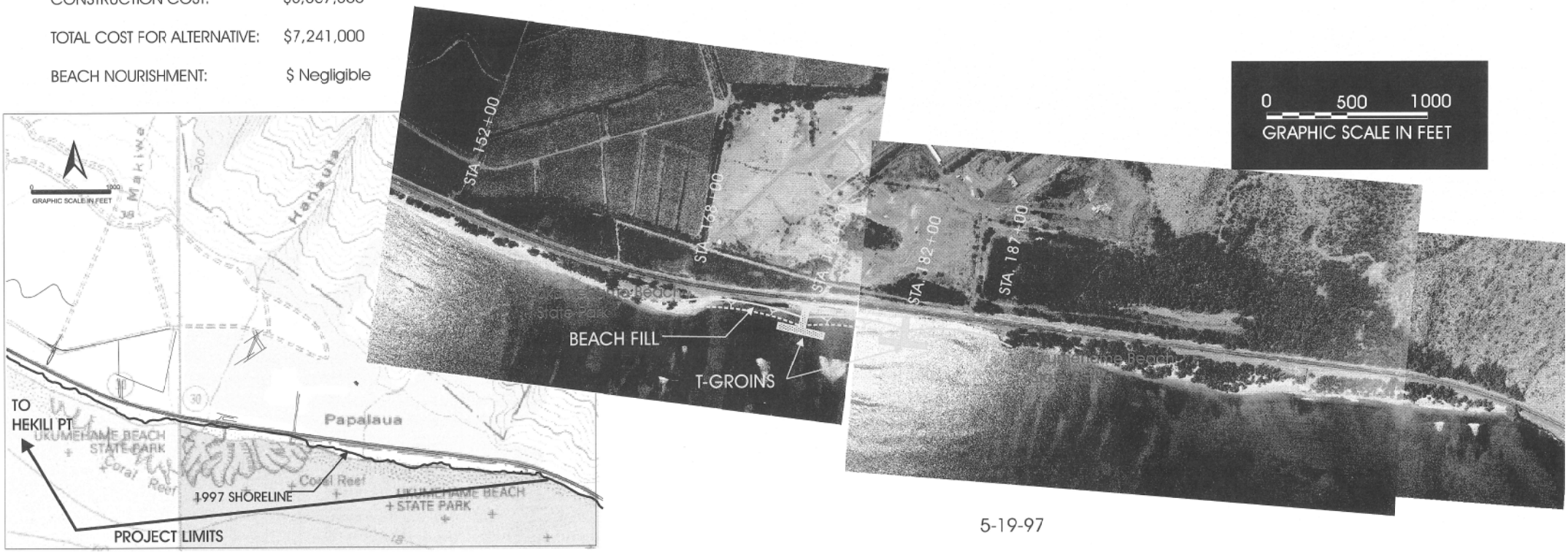


T-GROIN TYPICAL SECTION
STA. 176+00 & 182+00

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 691,600
ENGINEERING & DESIGN: $ 691,600
CONSTRUCTION COST: $5,857,800

TOTAL COST FOR ALTERNATIVE: $7,241,000

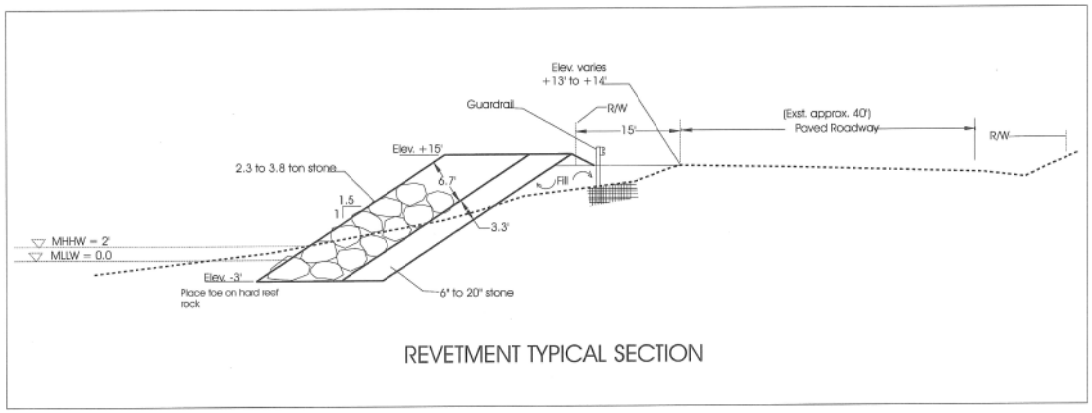
BEACH NOURISHMENT: $ Negligible



5-19-97

ALTERNATE PLAN - BEACH FILL
UKUMEHAME-3, MAUI

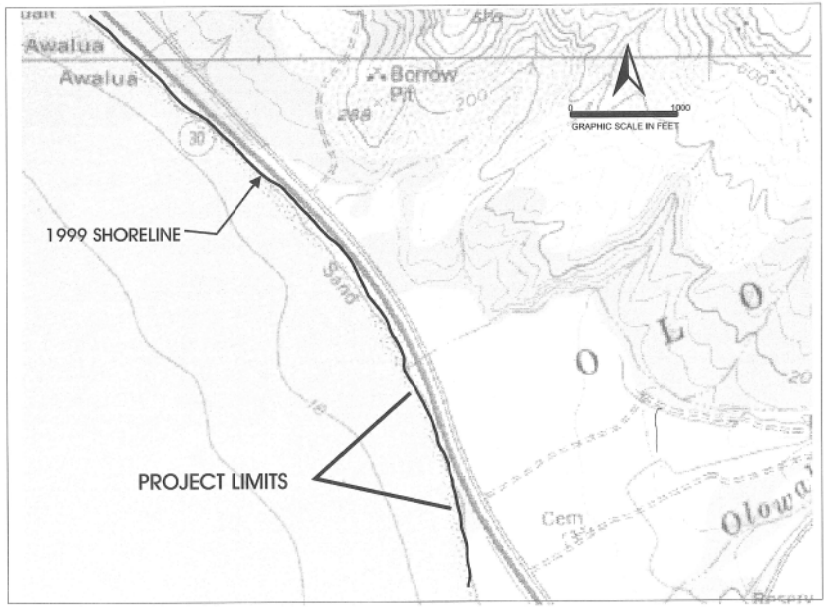
Statewide Highway Shoreline Protection
Project number HWY-08-98



REVETMENT TYPICAL SECTION

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 362,900
ENGINEERING & DESIGN: $ 362,900
CONSTRUCTION COST: $3,073,900

TOTAL COST FOR ALTERNATIVE: $3,799,700

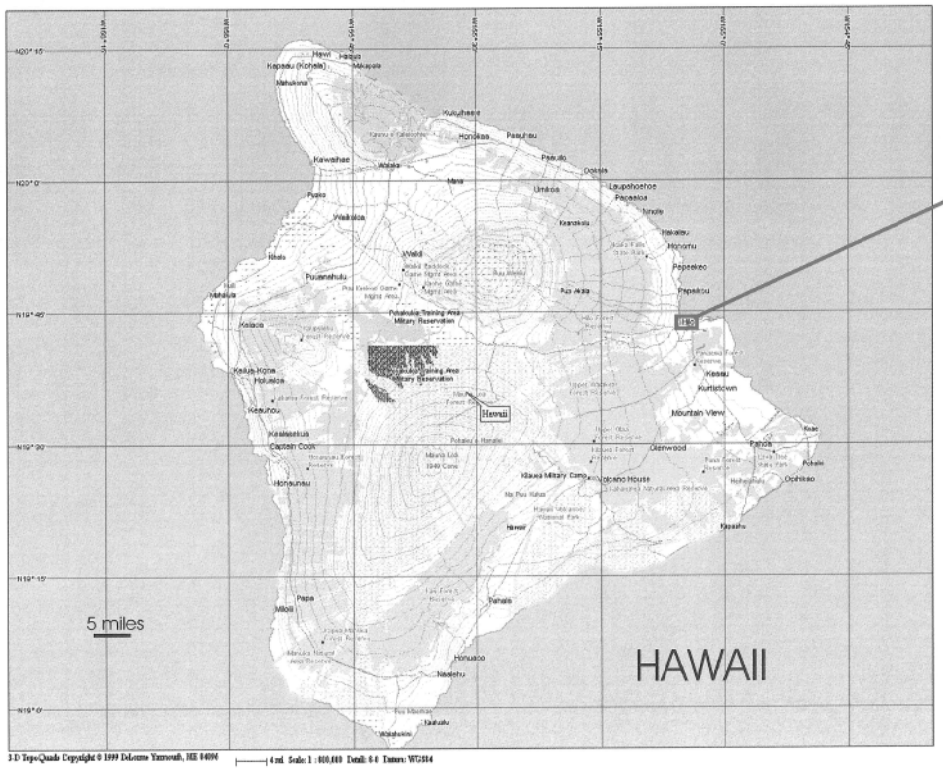


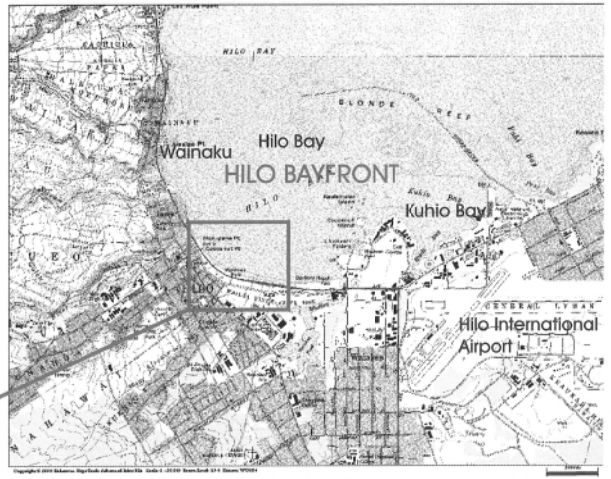


9-28-99

ALTERNATE PLAN - REVETMENT
OLOWALU, MAUI

Statewide Highway Shoreline Protection
Project number HWY-08-98



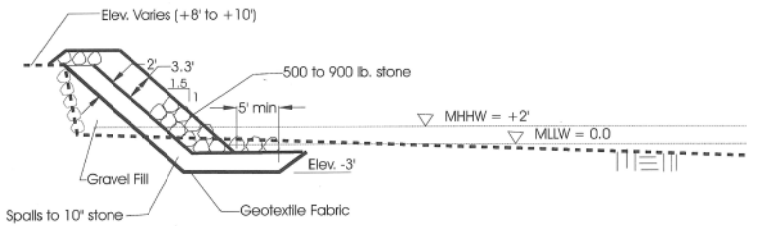


ISLAND OF HAWAII
PRIORITY AREAS - ALTERNATIVE PLANS

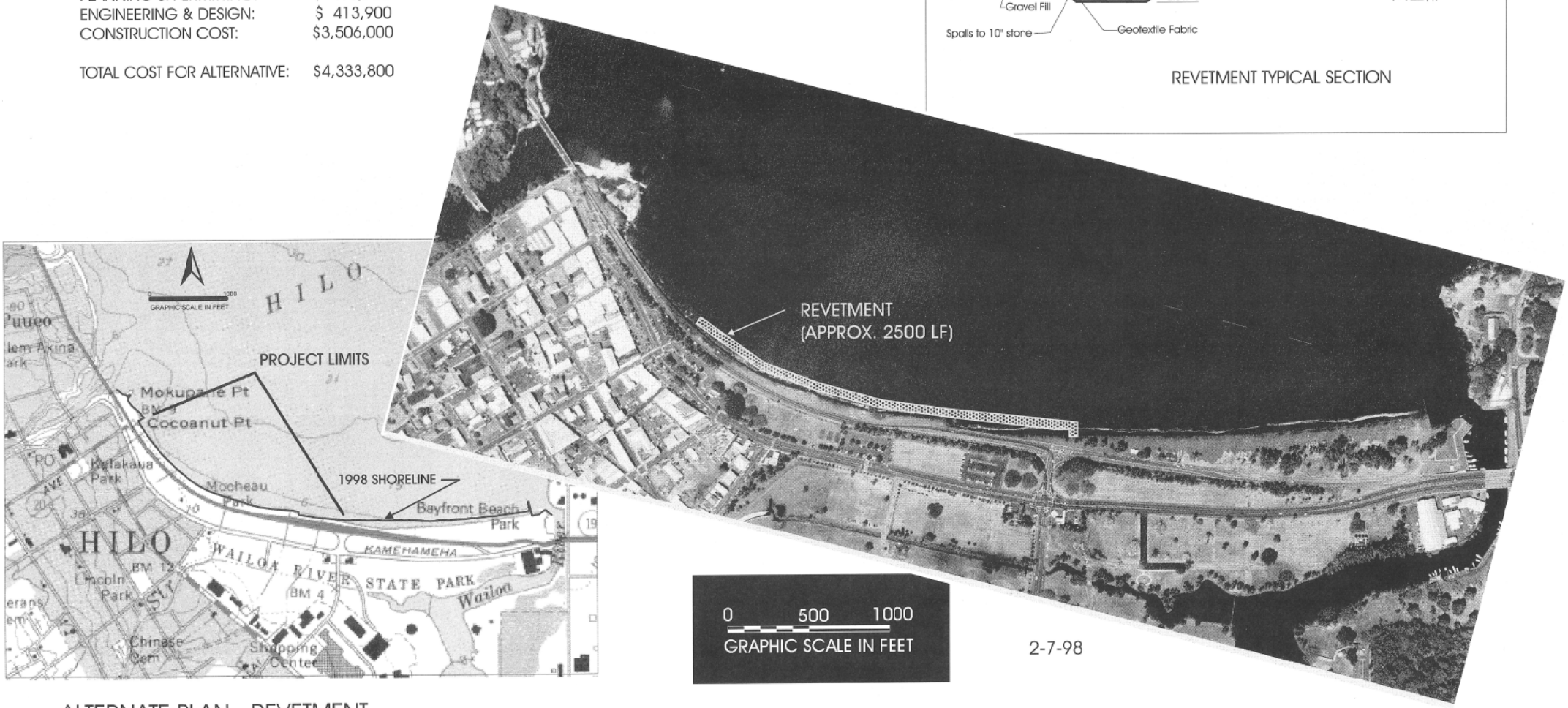
Statewide Highway Shoreline Protection
Project number HWY-08-98

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 413,900
ENGINEERING & DESIGN: $ 413,900
CONSTRUCTION COST: $3,506,000

TOTAL COST FOR ALTERNATIVE: $4,333,800



REVETMENT TYPICAL SECTION



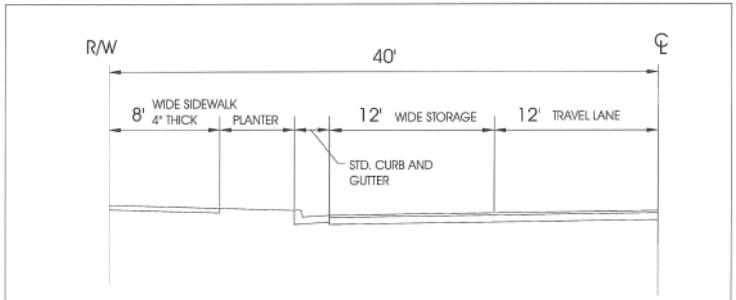
2-7-98

ALTERNATE PLAN - REVETMENT
HILO BAY, HAWAII

Statewide Highway Shoreline Protection
Project number HWY-08-98

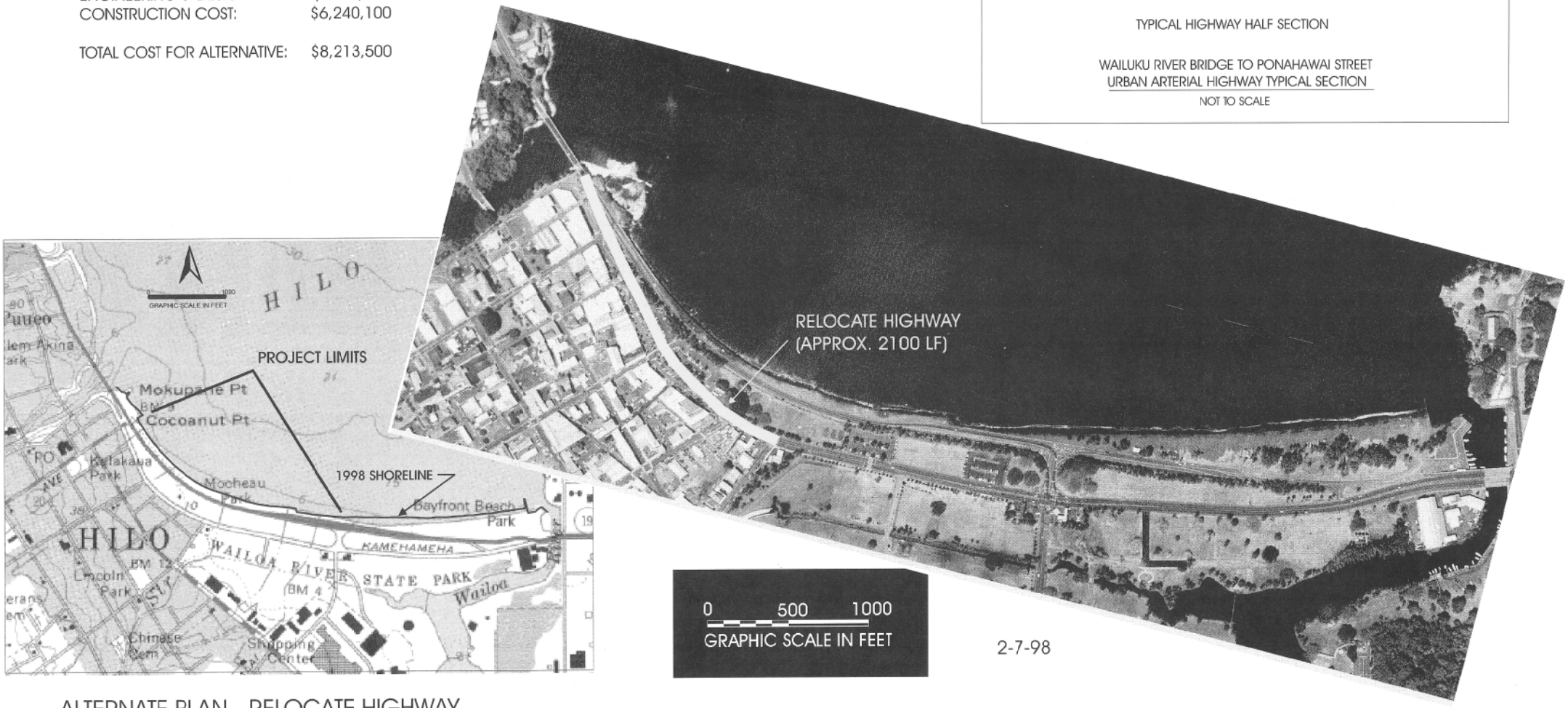
REAL ESTATE (R/W ACQUISITION): $ 500,000
PLANNING & PERMITTING: $ 736,700
ENGINEERING & DESIGN: $ 736,700
CONSTRUCTION COST: $6,240,100

TOTAL COST FOR ALTERNATIVE: $8,213,500



TYPICAL HIGHWAY HALF SECTION

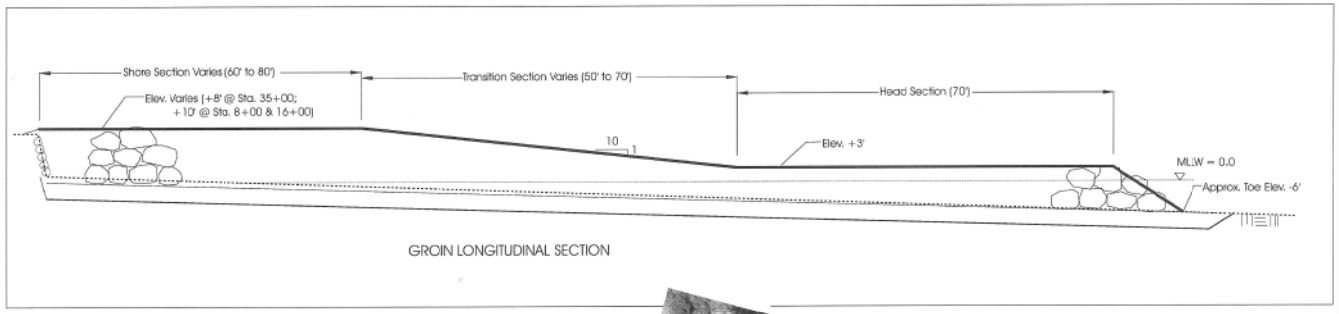
WAILUKU RIVER BRIDGE TO PONAHAWAI STREET
URBAN ARTERIAL HIGHWAY TYPICAL SECTION
NOT TO SCALE



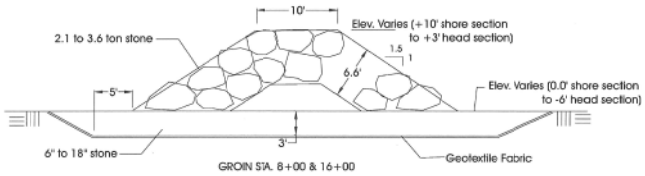
2-7-98

ALTERNATE PLAN - RELOCATE HIGHWAY
HILO BAY, HAWAII

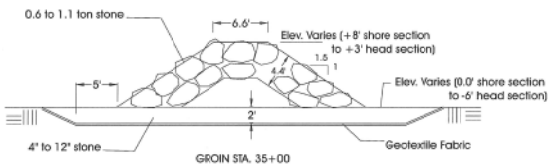
Statewide Highway Shoreline Protection
Project number HWY-08-98



GROIN LONGITUDINAL SECTION



GROIN STA. 8+00 & 16+00



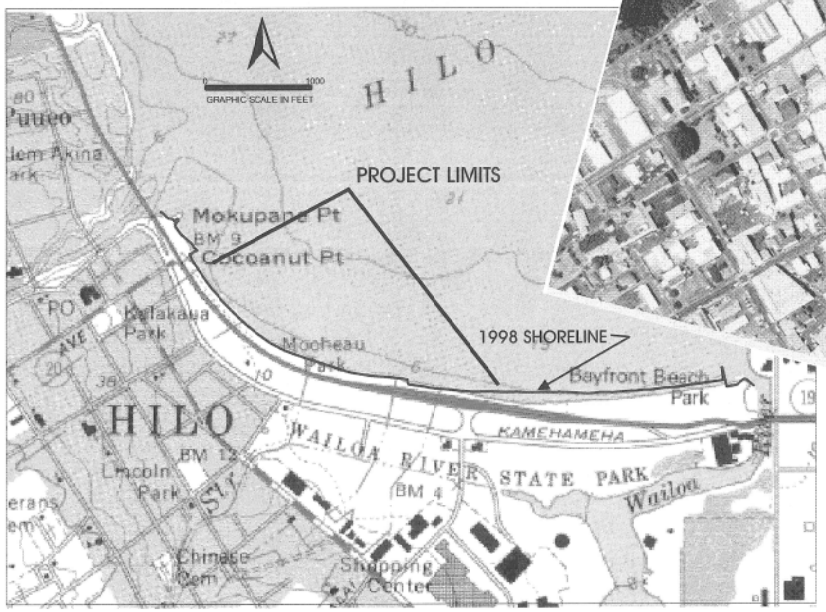
GROIN STA. 35+00

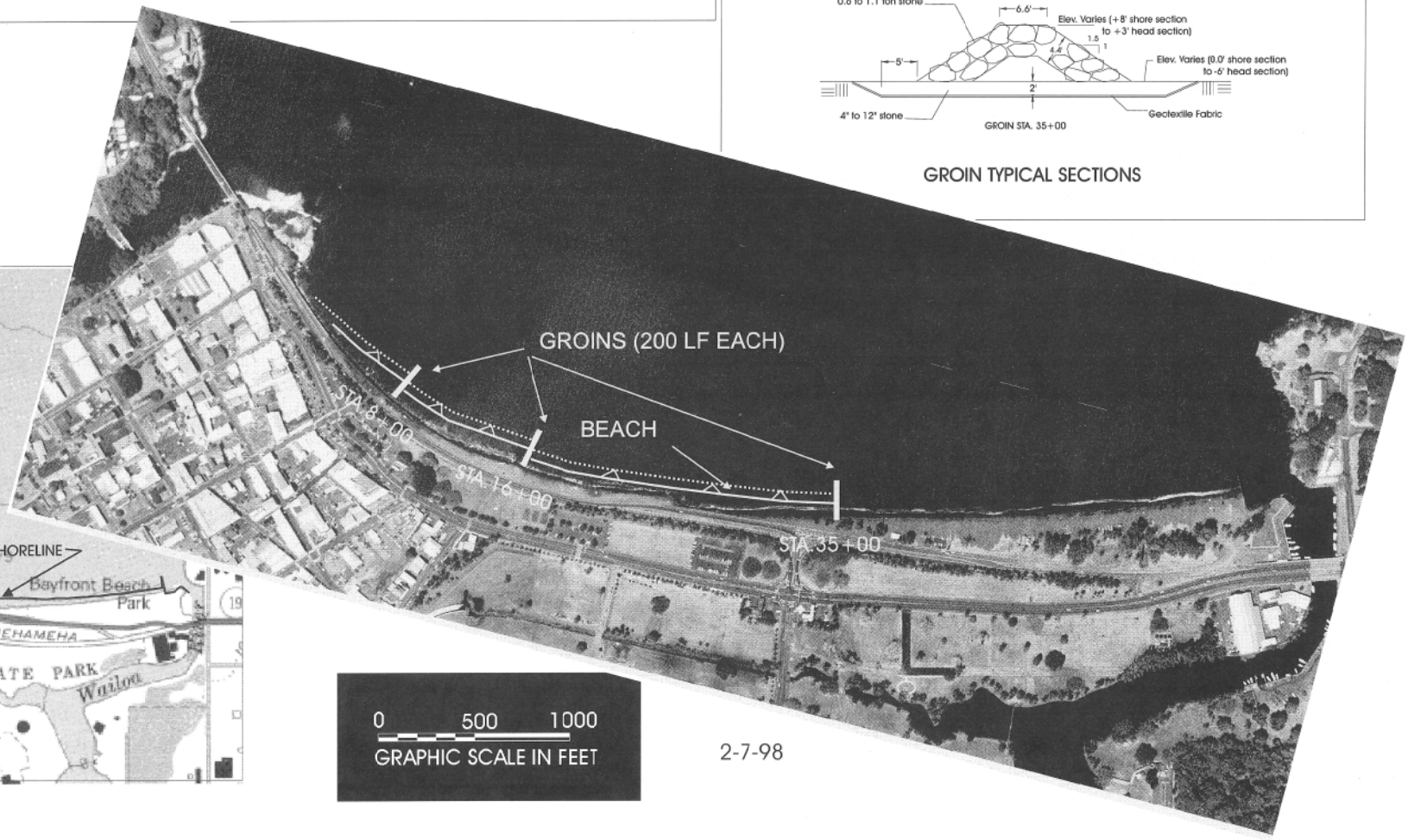
GROIN TYPICAL SECTIONS

REAL ESTATE (R/W ACQUISITION): $ N/A
PLANNING & PERMITTING: $ 1,230,600
ENGINEERING & DESIGN: $ 1,230,600
CONSTRUCTION COST: $10,423,200

TOTAL COST FOR ALTERNATIVE: $12,884,400

BEACH NOURISHMENT: $ Negligible



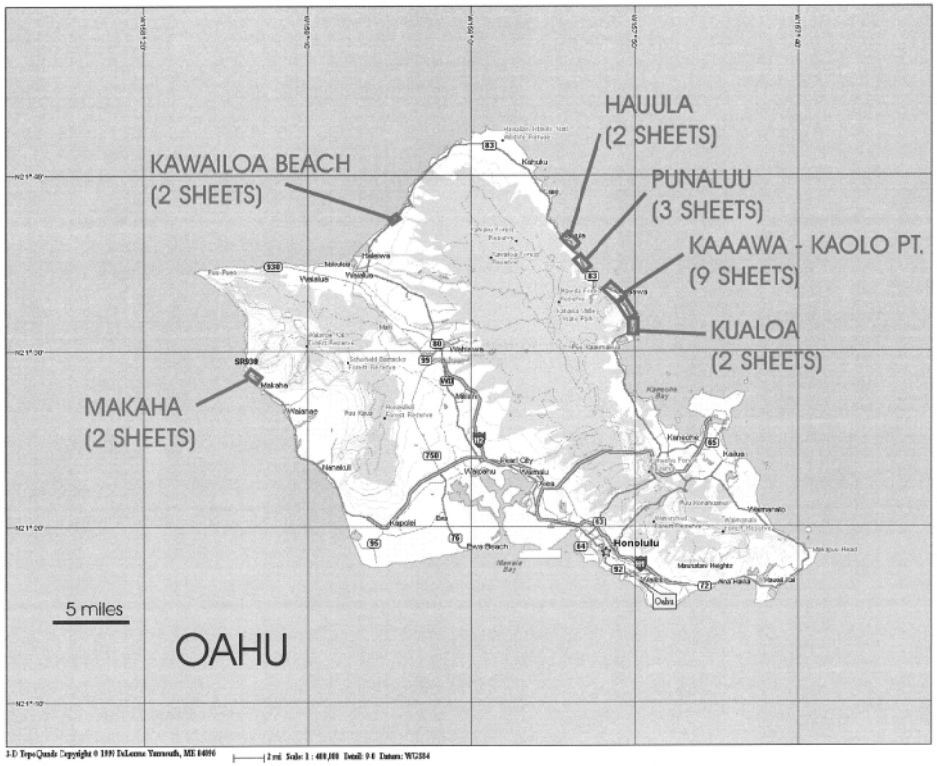


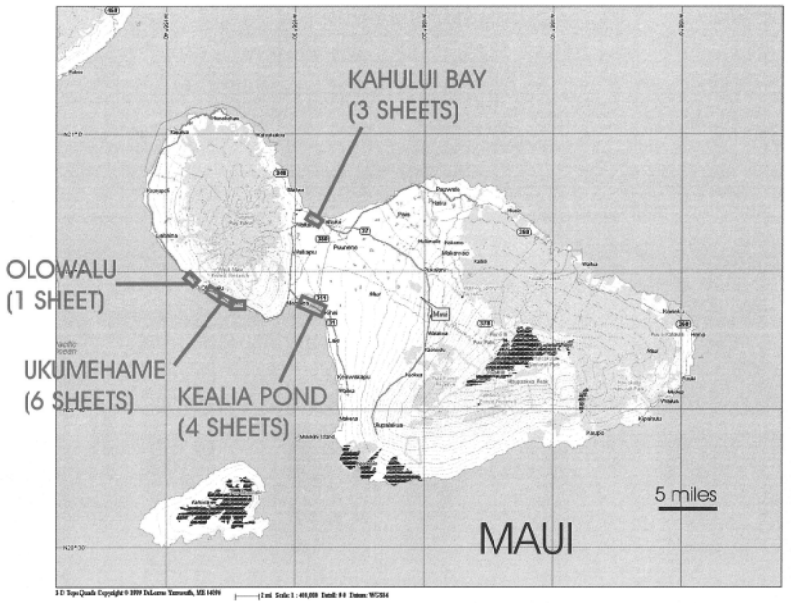
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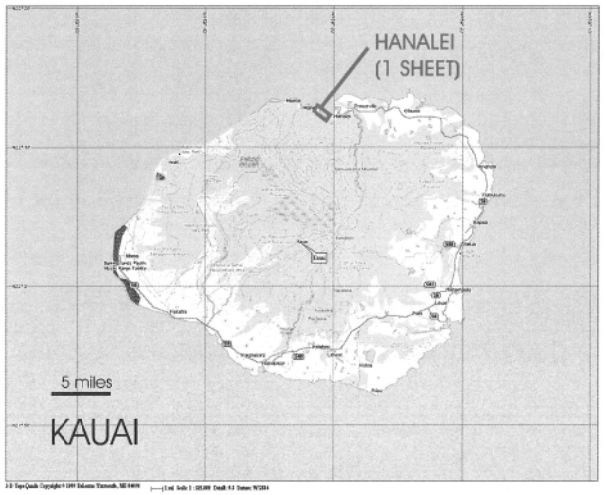
ALTERNATE PLAN - BEACH FILL
HILO BAY, HAWAII

Statewide Highway Shoreline Protection
Project number HWY-08-98

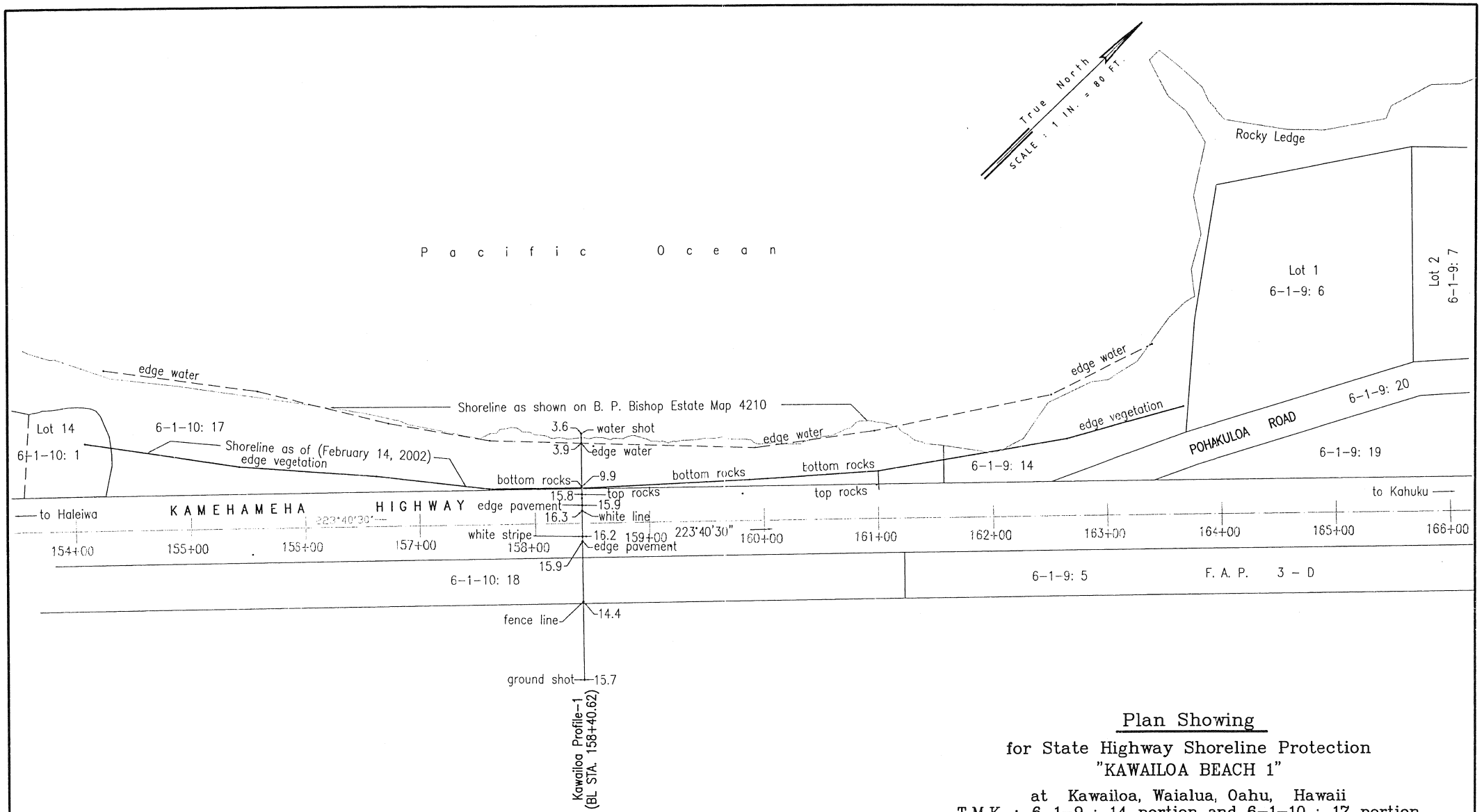
6 - SURVEY DATA







Statewide Highway Shoreline Protection
Project number HWY-08-98



Plan Showing

for State Highway Shoreline Protection
"KAWAILOA BEACH 1"

at Kawailoa, Waialua, Oahu, Hawaii
T.M.K. : 6-1-9 : 14 portion and 6-1-10 : 17 portion

Client : Edward K. Noda and Associates, Inc.

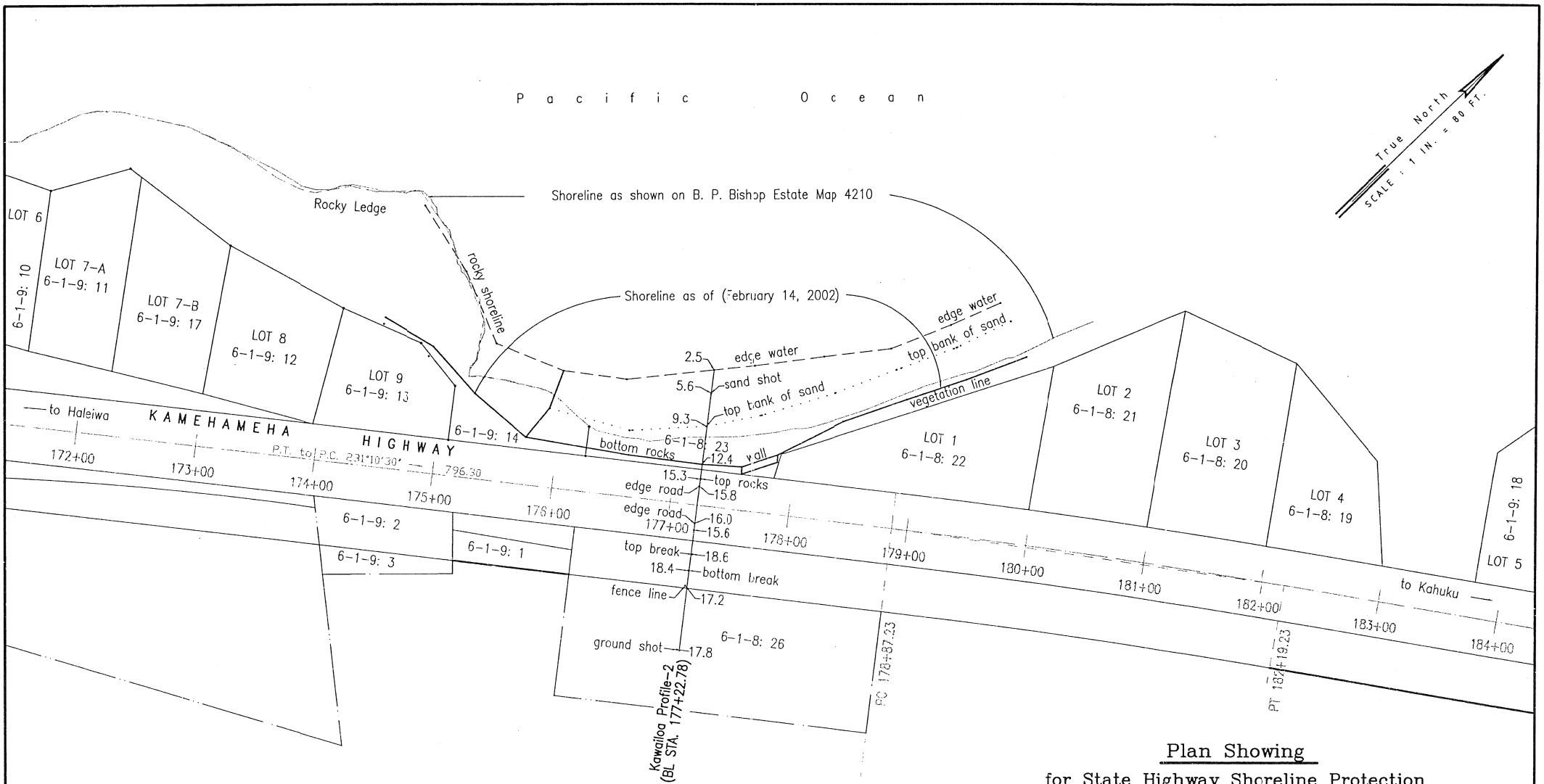
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Kendall N. H. Hee
Licensed Professional Land Surveyor
Certificate Number 5649

Honolulu, Hawaii
FB: 1305 / pages 14-17
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ PLANNERS

900 Halekauwila Street
February 14, 2002
Revised : May 13, 2002



Plan Showing

for State Highway Shoreline Protection
"KAWAILOA BEACH 2"

at Kawailoa, Waialua, Oahu, Hawaii
T.M.K. : 6-1-9 : 14 portion and 6-1-10 : 17 portion

Client : Edward K. Noda and Associates, Inc.

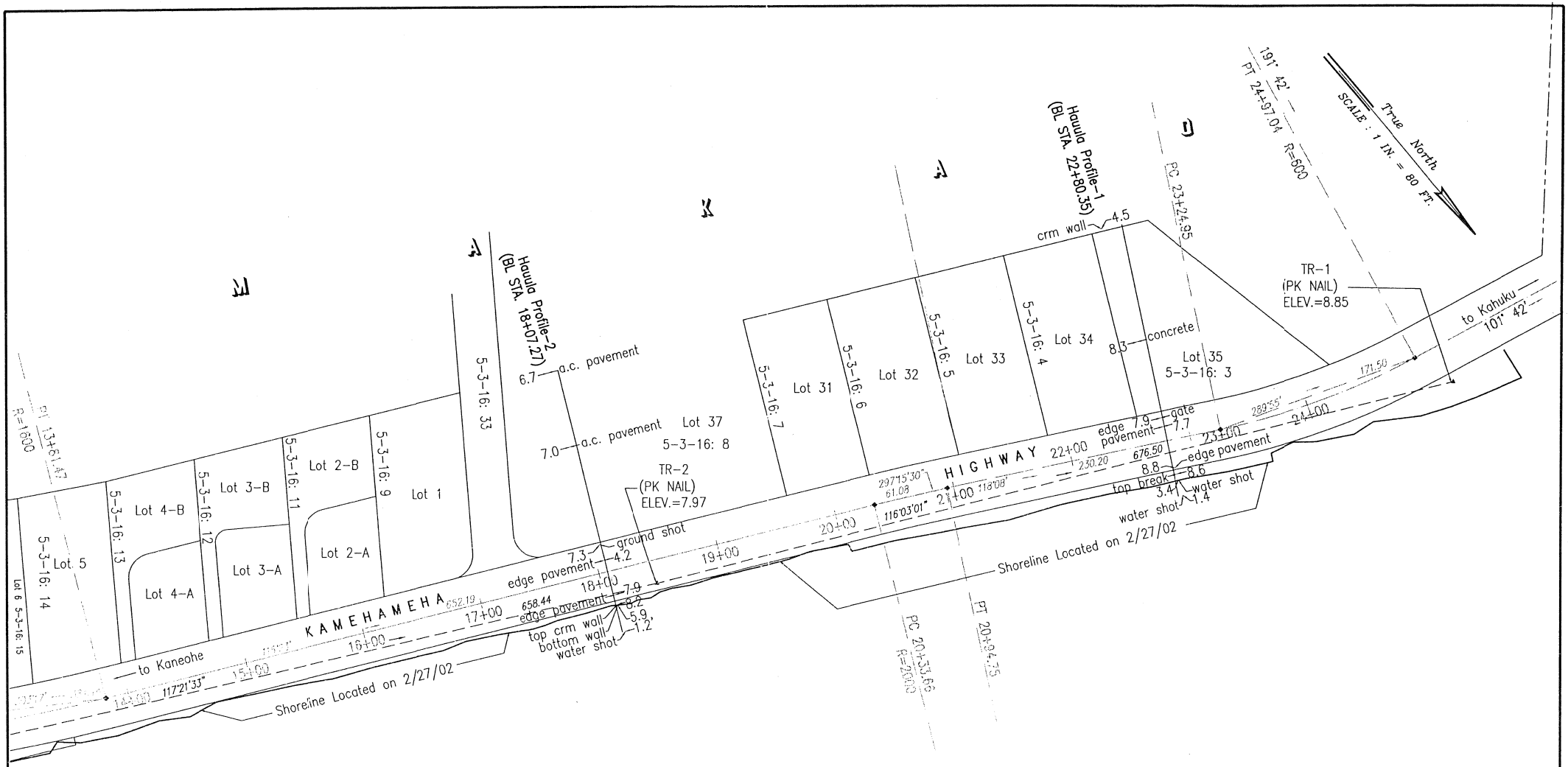
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Licensed Professional Land Surveyor
Certificate Number 5649

Honolulu, Hawaii
FB: 1305 / pages 14-17
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
February 14, 2002
Revised : May 13, 2002



Plan Showing

for State Highway Shoreline Protection
"HAUULA BEACH 1 & 2"
at Makao, Koolauloa, Oahu, Hawaii
T.M.K. : 5-3-14 and 5-3-16 : portion

Client: Edward K. Noda and Associates, Inc.

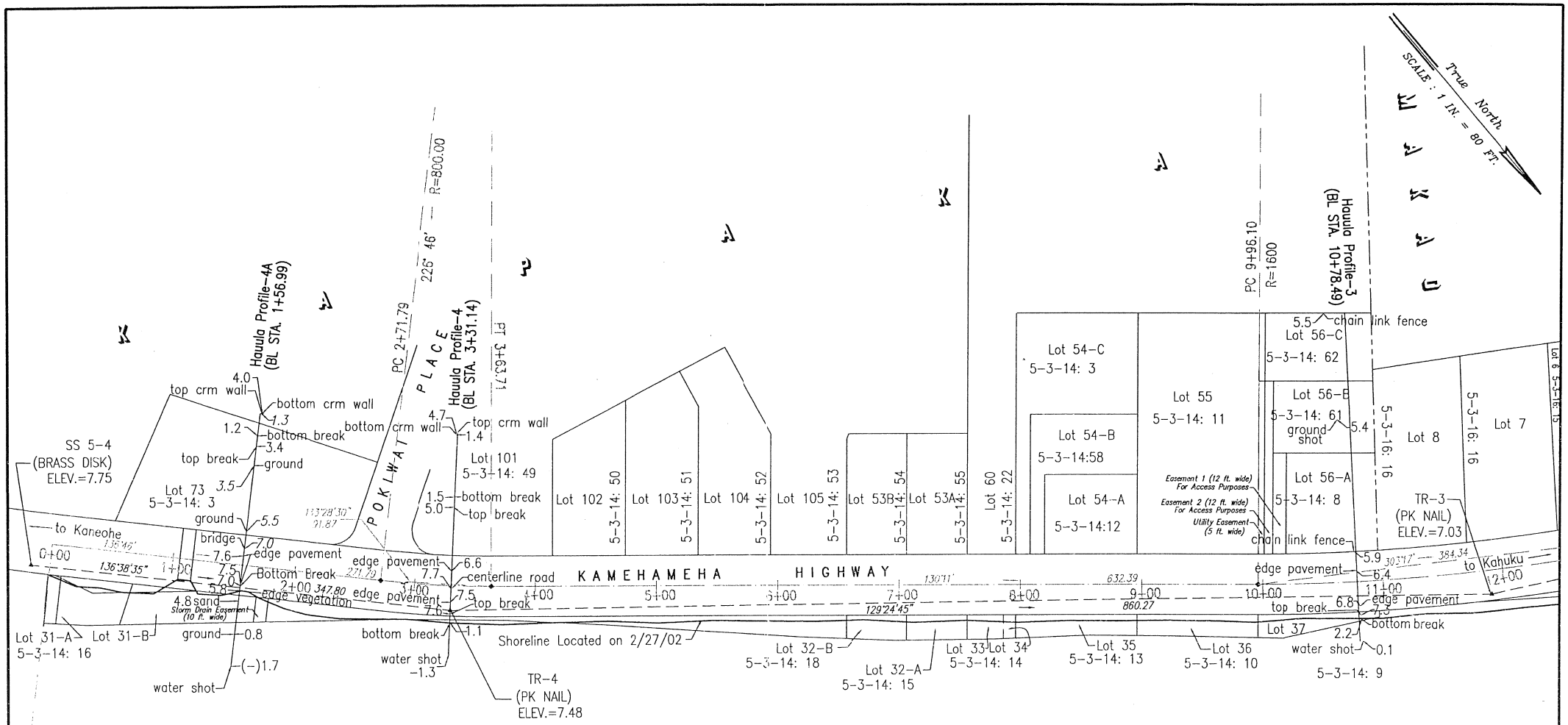
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Licensed Professional Land Surveyor
Certificate Number 5649

Honolulu, Hawaii
FB: 1111 / pages 22-33
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
March 30, 2002
Revised : April 26, 2002



Plan Showing

for State Highway Shoreline Protection
"HAUULA BEACH 3 & 4"
at Kapaka-Makao, Koolauloa, Oahu, Hawaii
T.M.K. : 5-3-14 and 5-3-16 : portion

Client: Edward K. Noda and Associates, Inc.

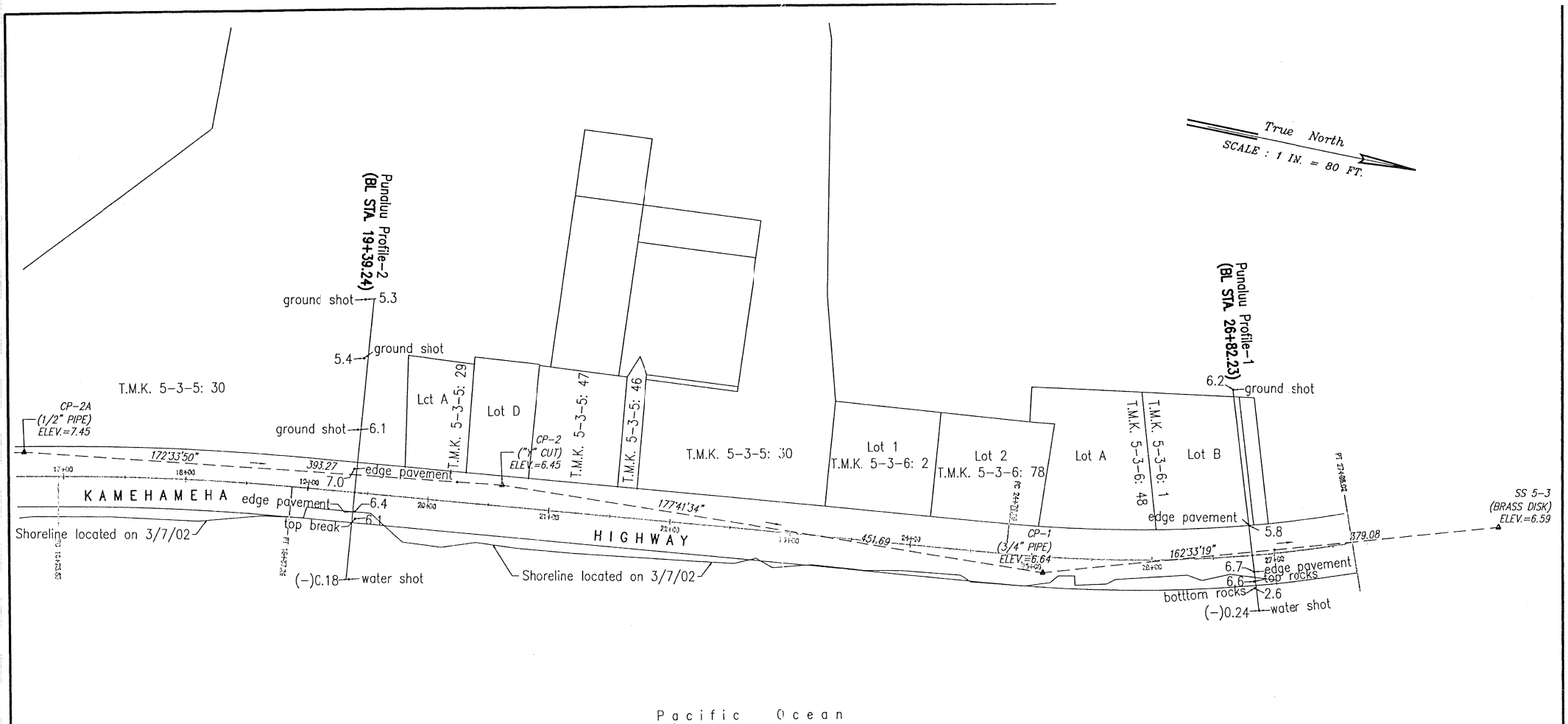
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Licensed Professional Land Surveyor
Certificate Number 5649

Honolulu, Hawaii
FB: 1111 / pages 22-33
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
March 30, 2002
Revised : May 13, 2002 Revised : April 26, 2002



PRELIMINARY
Subject to Change

Plan Showing

for State Highway Shoreline Protection
"PUNALUU BEACH 1, 2 and SHORELINE"
at Kapano, Puheemiki, Koolauloa, Oahu, Hawaii
T.M.K. : 5-3-05 : portion and 5-3-06 : portion

Client: Edward K. Noda and Associates, Inc.

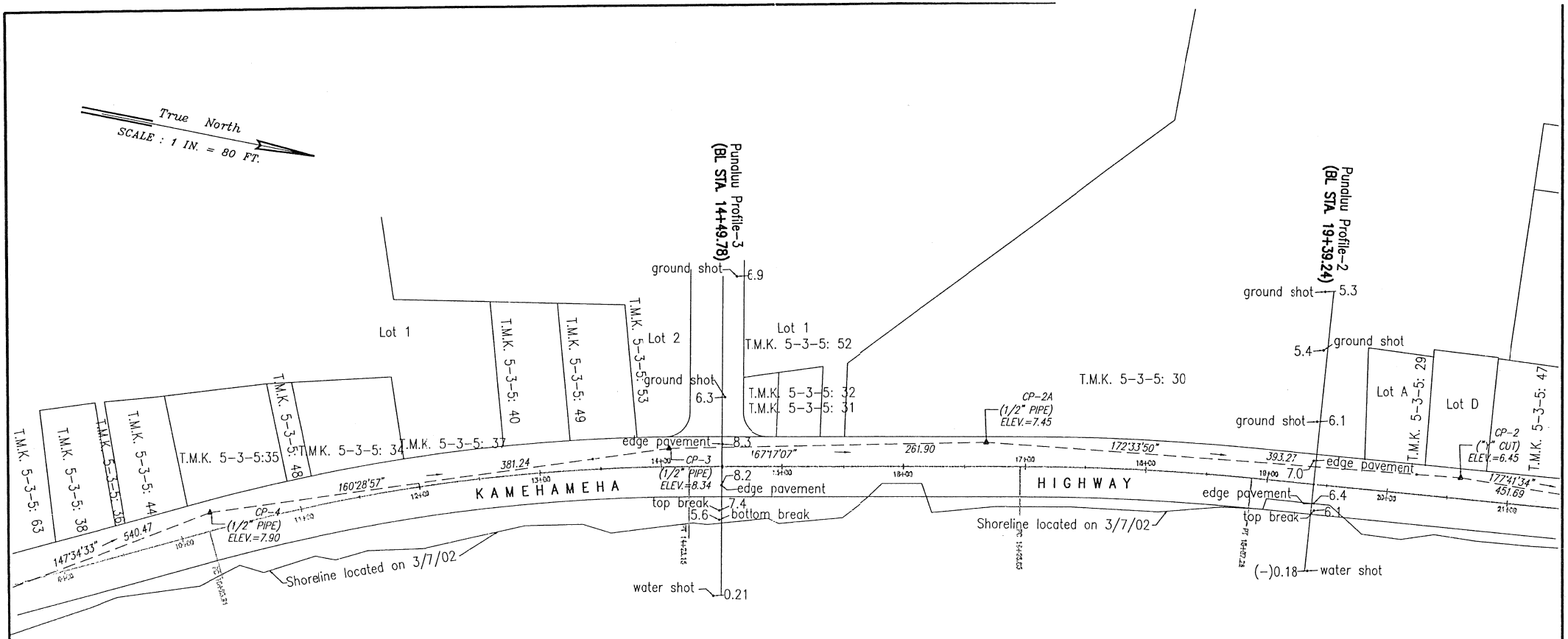
This work was prepared by me or
under my direct supervision.

Kendall N. H. Hee
Licensed Professional Land Surveyor
Certificate Number 5649

Honolulu, Hawaii
CP DWG. FILE
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
July 3, 2002



PRELIMINARY
Subject to Change

Plan Showing

for State Highway Shoreline Protection
"PUNALUU BEACH 2, 3 and SHORELINE"
at Kapano, Puheemiki, Koolauloa, Oahu, Hawaii
T.M.K. : 5-3-05 : portion

Client: Edward K. Noda and Associates, Inc.

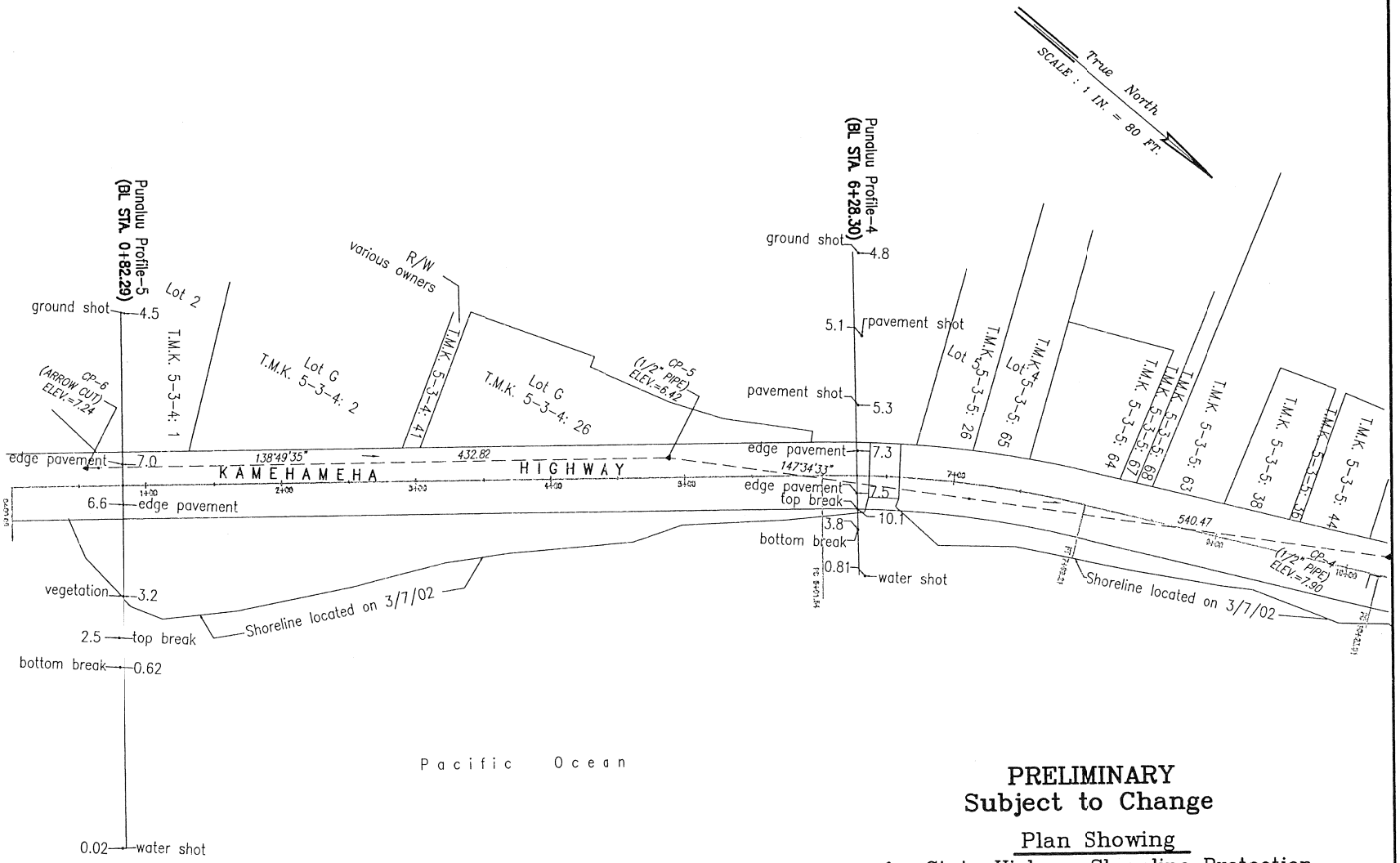
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under my direct supervision.

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Licensed Professional Land Surveyor
Certificate Number 5649

Honolulu, Hawaii
CP DWG. FILE
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
July 3, 2002



PRELIMINARY
Subject to Change

Plan Showing

for State Highway Shoreline Protection
"PUNALUU BEACH 4, 5 and SHORELINE"
at Kapano, Puheemiki, Koolauloa, Oahu, Hawaii
T.M.K. : 5-3-04 : portion and 5-3-05 : portion

Client: Edward K. Noda and Associates, Inc.

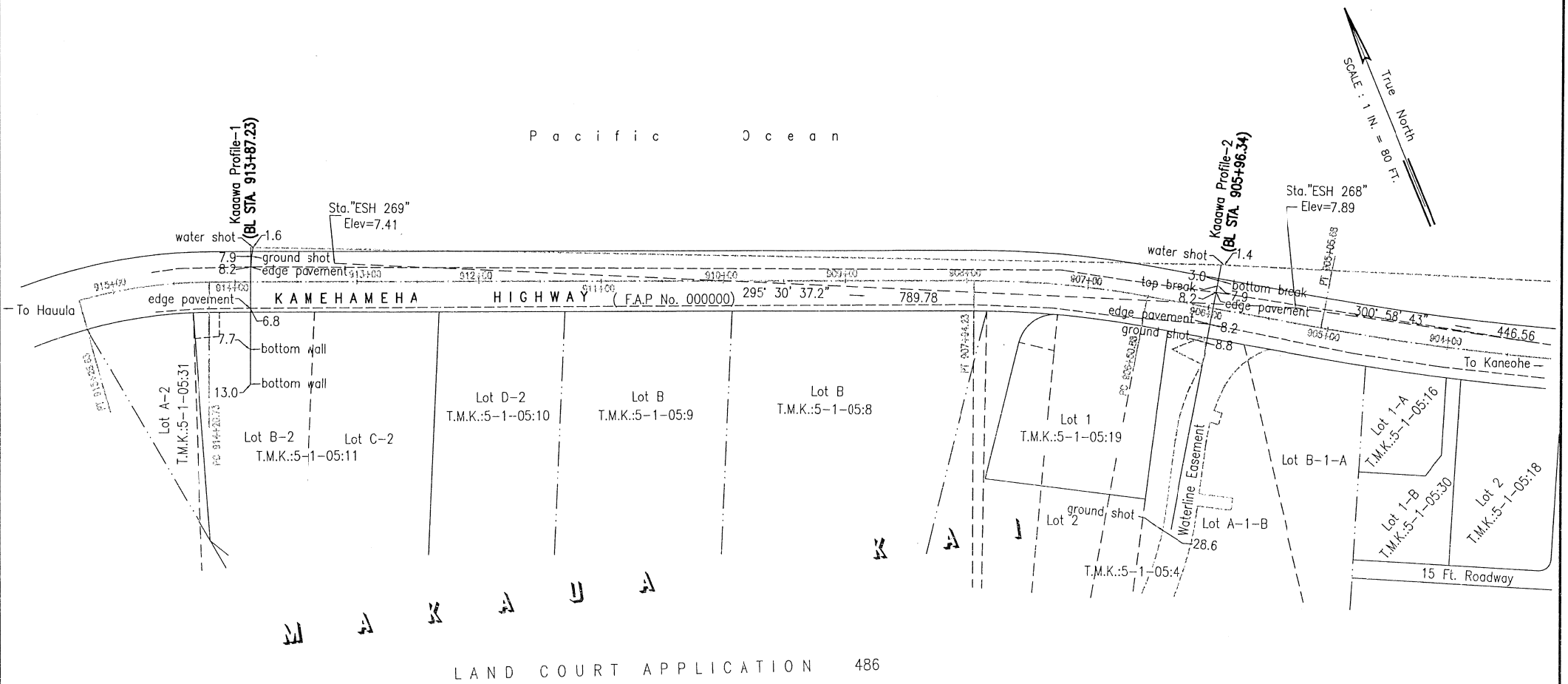
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Certificate Number 5649

Honolulu, Hawaii
CP DWG. FILE
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ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
July 3, 2002



PRELIMINARY
Plan Showing

for State Highway Shoreline Protection
"KAAAWA BEACH 1 and 2"
at Makaua, Koolauloa, Oahu, Hawaii
T.M.K. : 5-1-05

Client : Edward K. Noda and Associates, Inc.

Sheet 1 of 9 Sheets

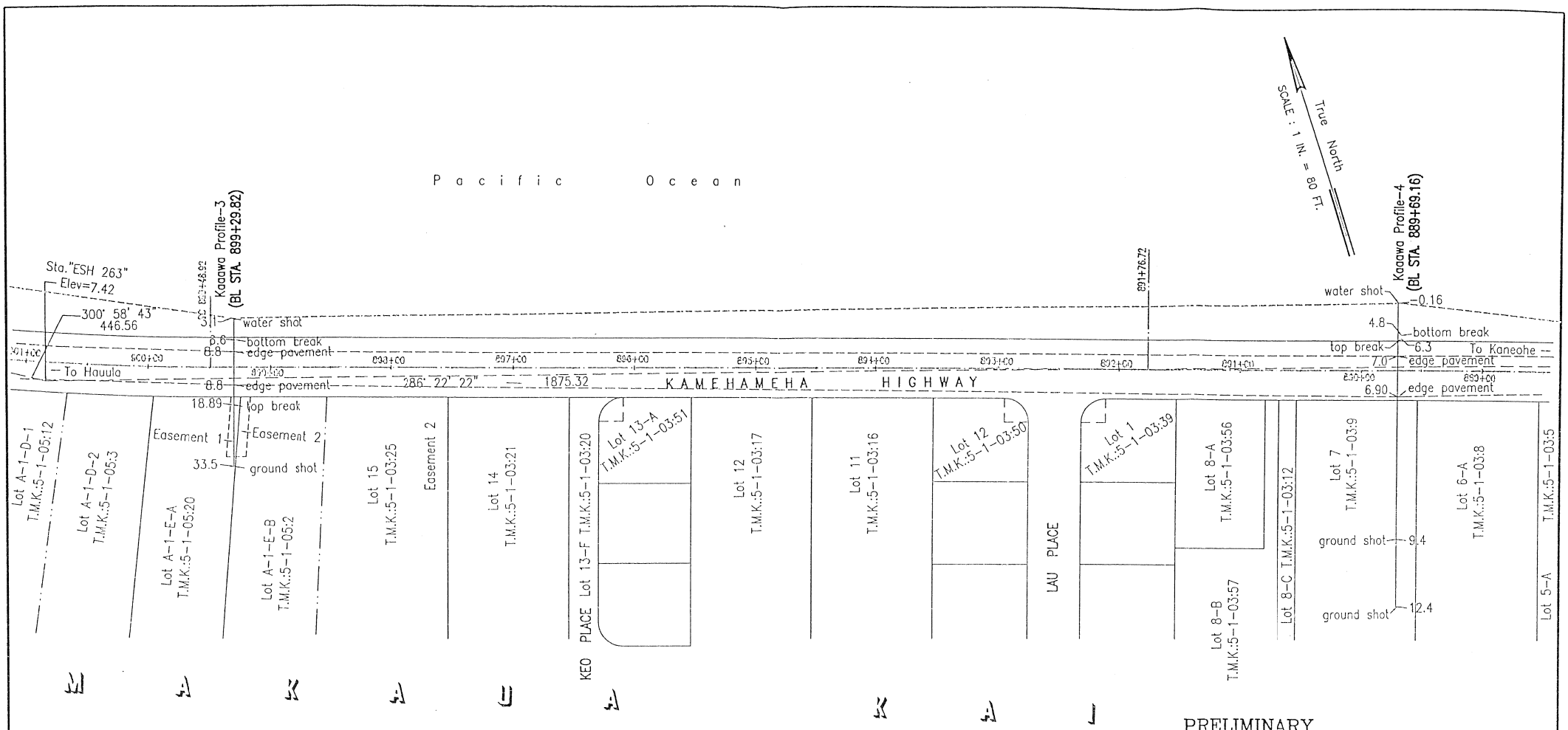
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Licensed Professional Land Surveyor
Certificate Number 5649

Honolulu, Hawaii
FB: 1291 & 1305
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
June 28, 2002



PRELIMINARY
Plan Showing

for State Highway Shoreline Protection
"KAAAWA BEACH 3 and 4"
at Makaua – Kai, Koolauloa, Oahu, Hawaii
T.M.K. : 5–1–03 and 05

Client : Edward K. Noda and Associates, Inc.

Sheet 2 of 9 Sheets

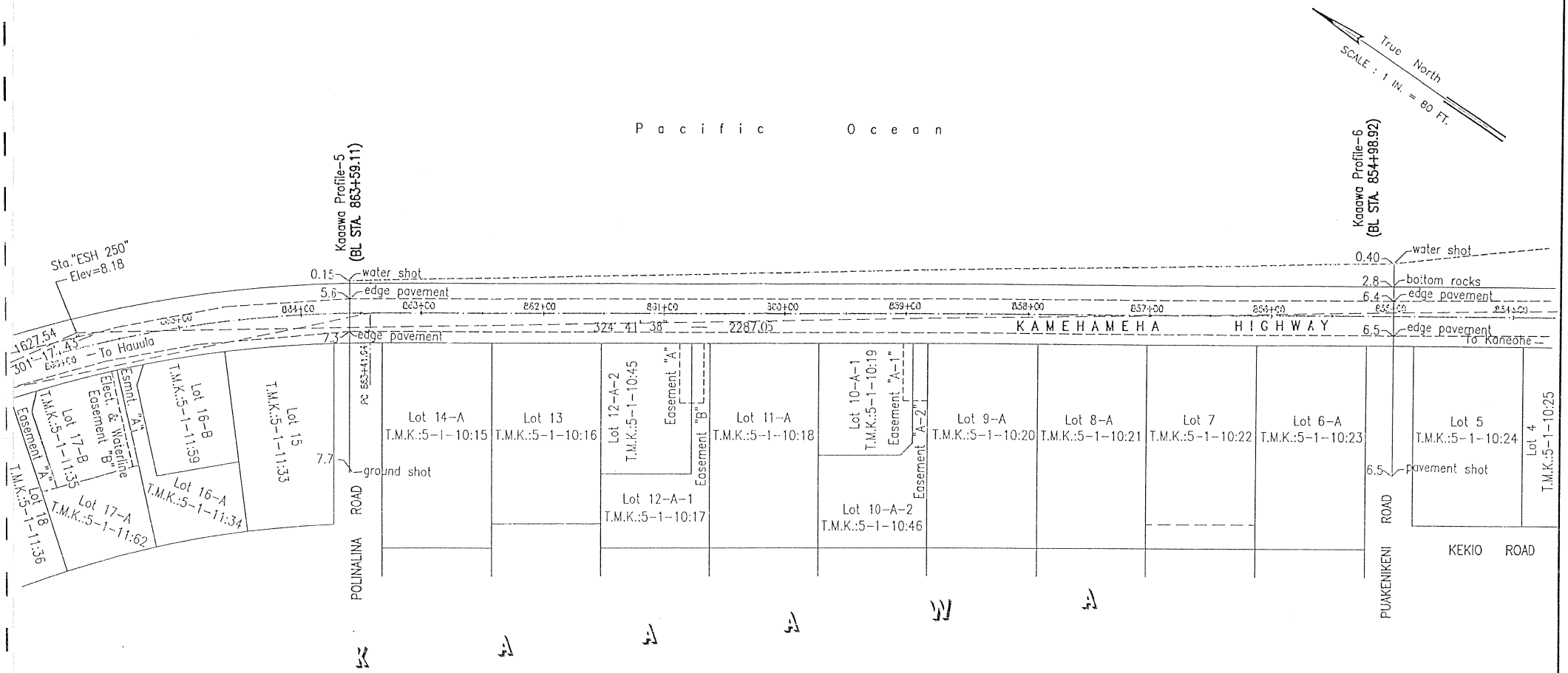
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51–100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
June 28, 2002



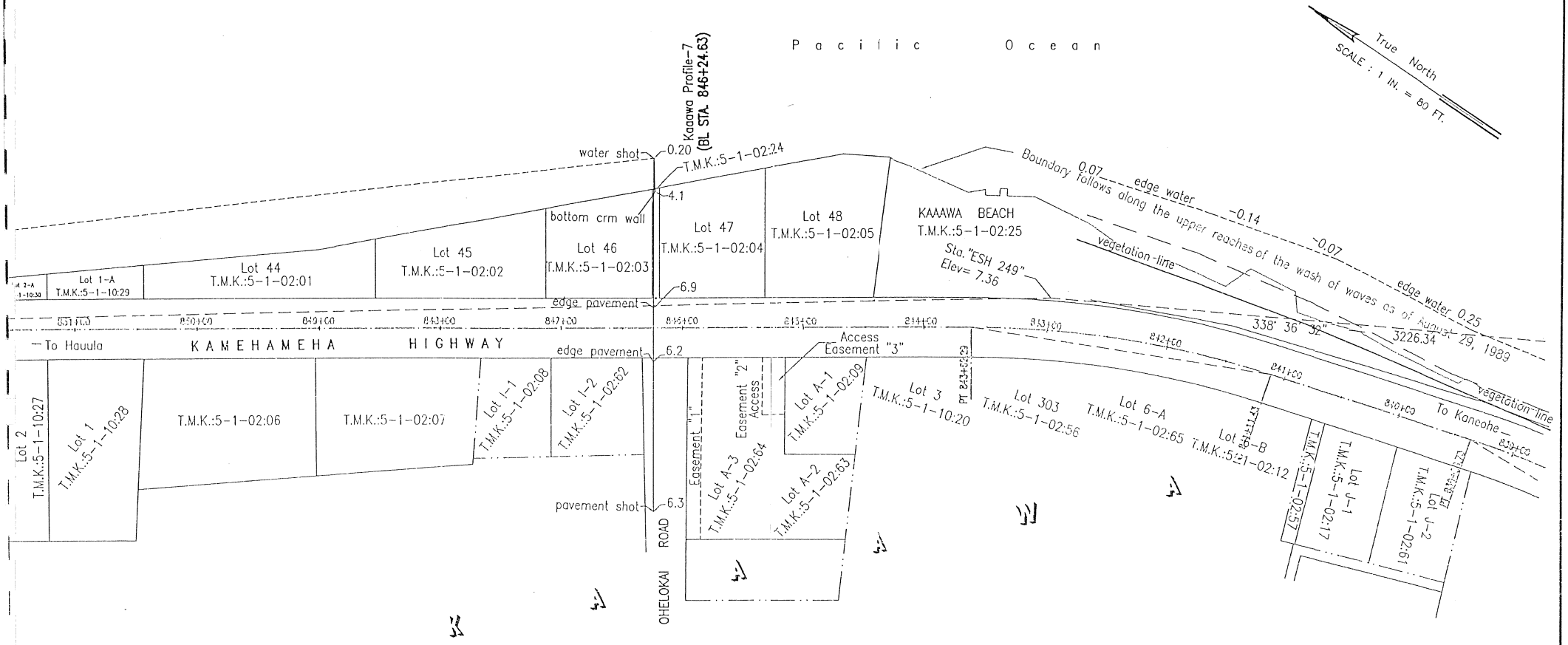
PRELIMINARY
Plan Showing
for State Highway Shoreline Protection
"KAAAWA BEACH 5 and 6"
at Kaaawa, Koolauloa, Oahu, Hawaii
T.M.K. : 5-1-10 and 11

Client : Edward K. Noda and Associates, Inc.

Sheet 3 of 9 Sheets

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Certificate Number 5649



PRELIMINARY

Plan Showing

for State Highway Shoreline Protection

"KAAAWA BEACH 7 AND SHORELINE"

at Kaaawa, Koolauloa, Oahu, Hawaii

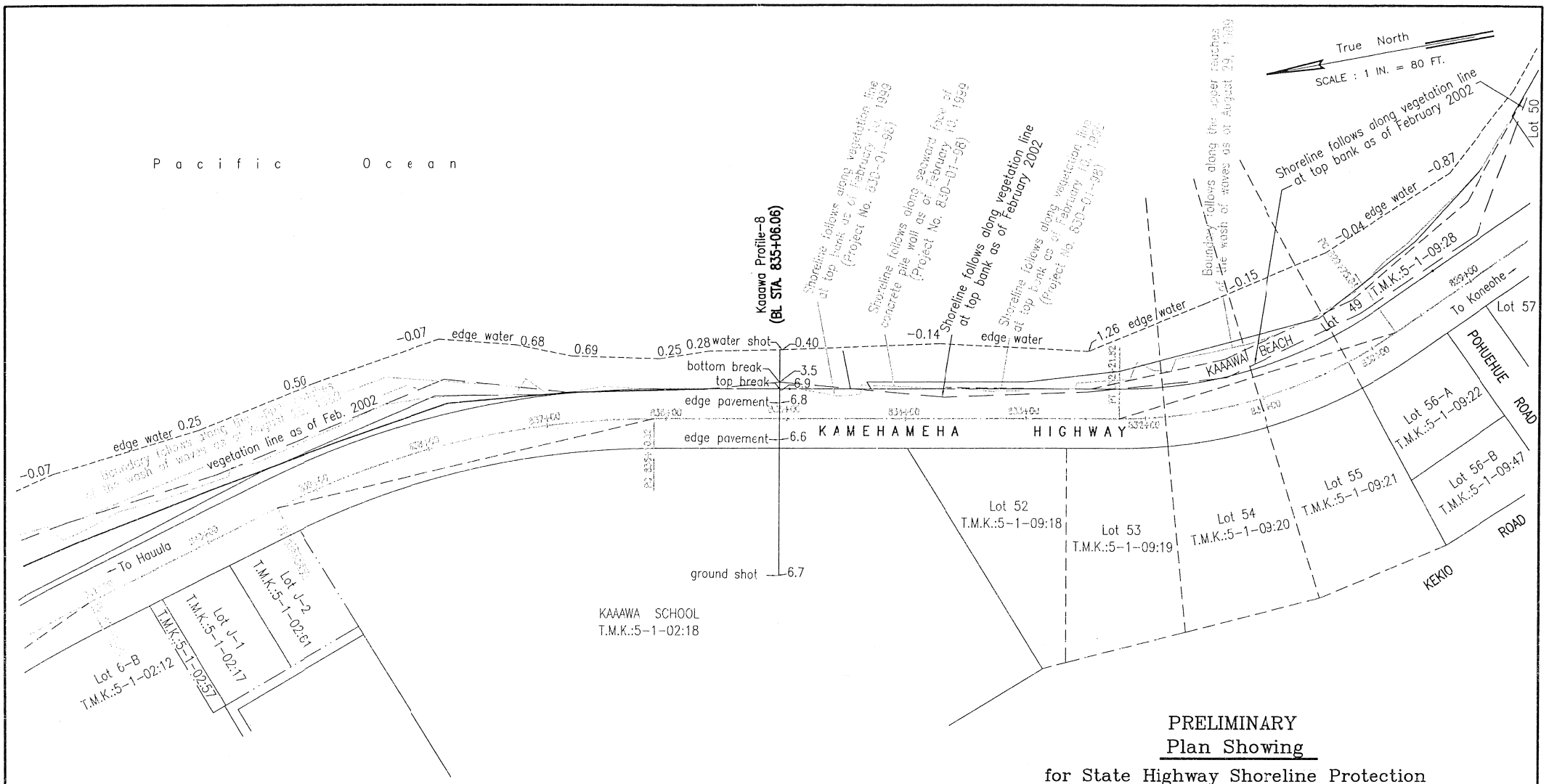
T.M.K. : 5-1-02 and 10

Client : Edward K. Noda and Associates, Inc.

Sheet 4 of 9 Sheets

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Certificate Number 5649



PRELIMINARY
Plan Showing

for State Highway Shoreline Protection
"KAAAWA BEACH 8 and SHORELINE"
at Kaaawa, Koolauloa, Oahu, Hawaii
T.M.K. : 5-1-02 and 09

Client : Edward K. Noda and Associates, Inc.

Sheet 5 of 9 Sheets

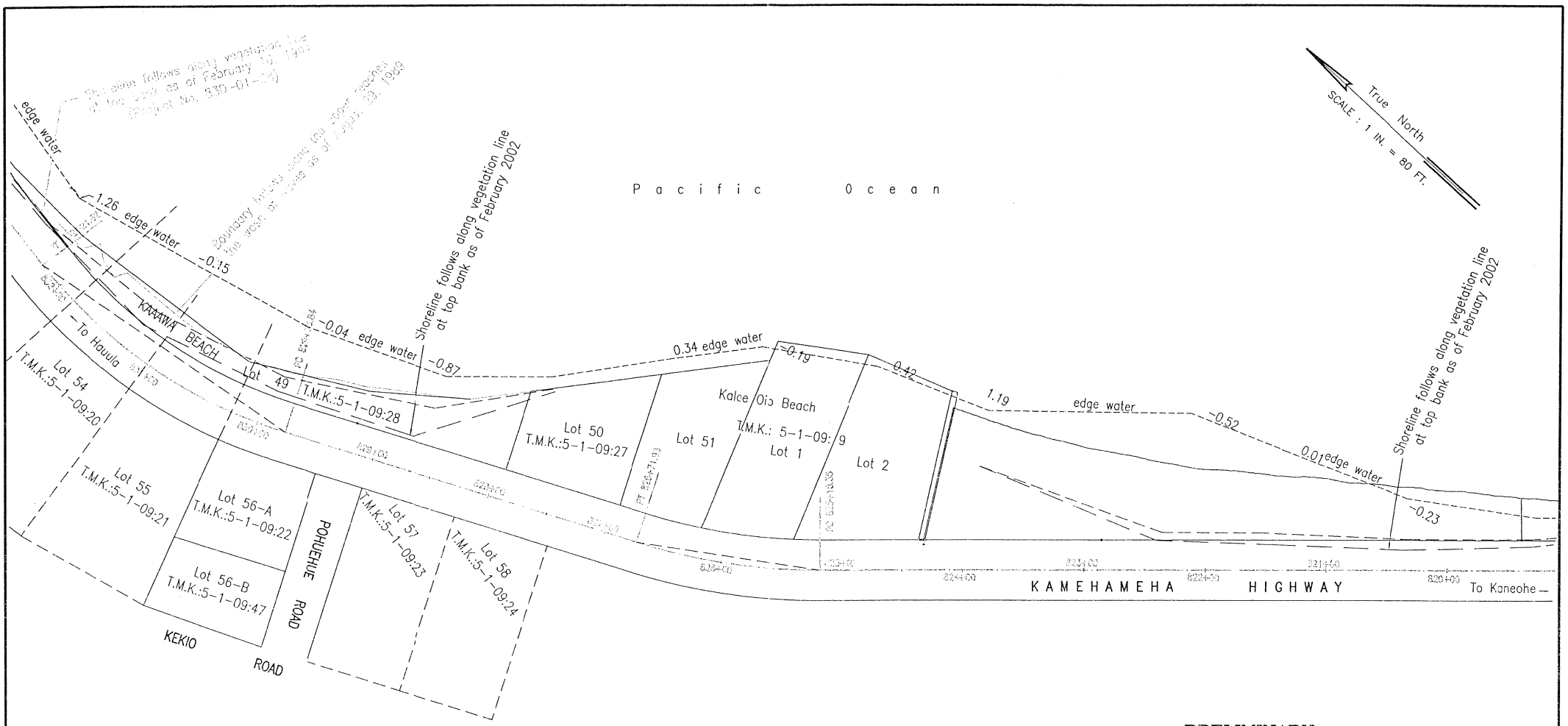
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CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
June 28, 2002



PRELIMINARY

Plan Showing

for State Highway Shoreline Protection
"KAAAWA SHORELINE between 8 and 9"
at Kaaawa, Koolauloa, Oahu, Hawaii
T.M.K. : 5-1-09

Client : Edward K. Noda and Associates, Inc.

Sheet 6 of 9 Sheets

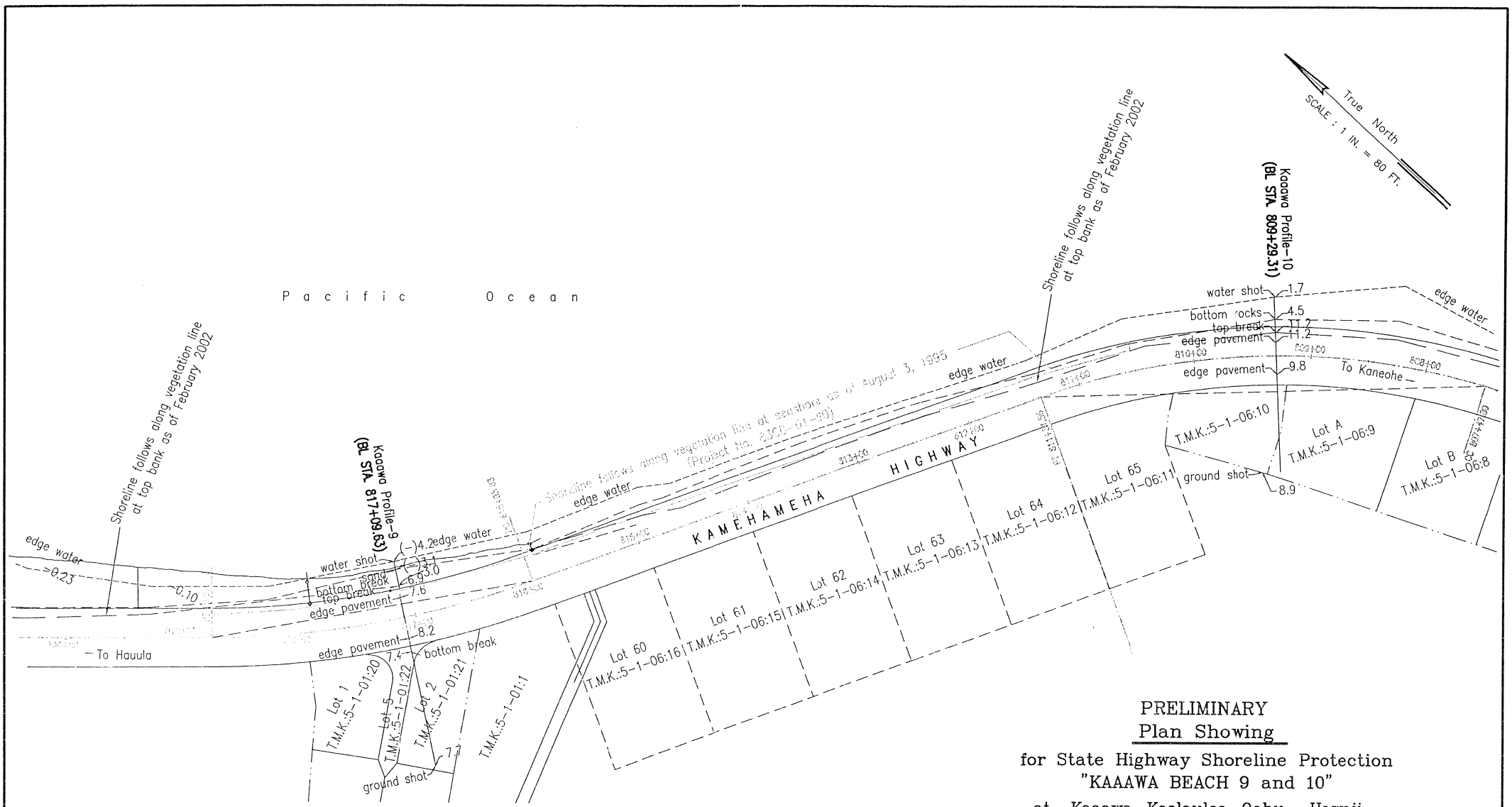
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900 Halekauwila Street
June 28, 2002



PRELIMINARY

Plan Showing

for State Highway Shoreline Protection

"KAAAWA BEACH 9 and 10"

at Kaaawa, Koolauloa, Oahu, Hawaii

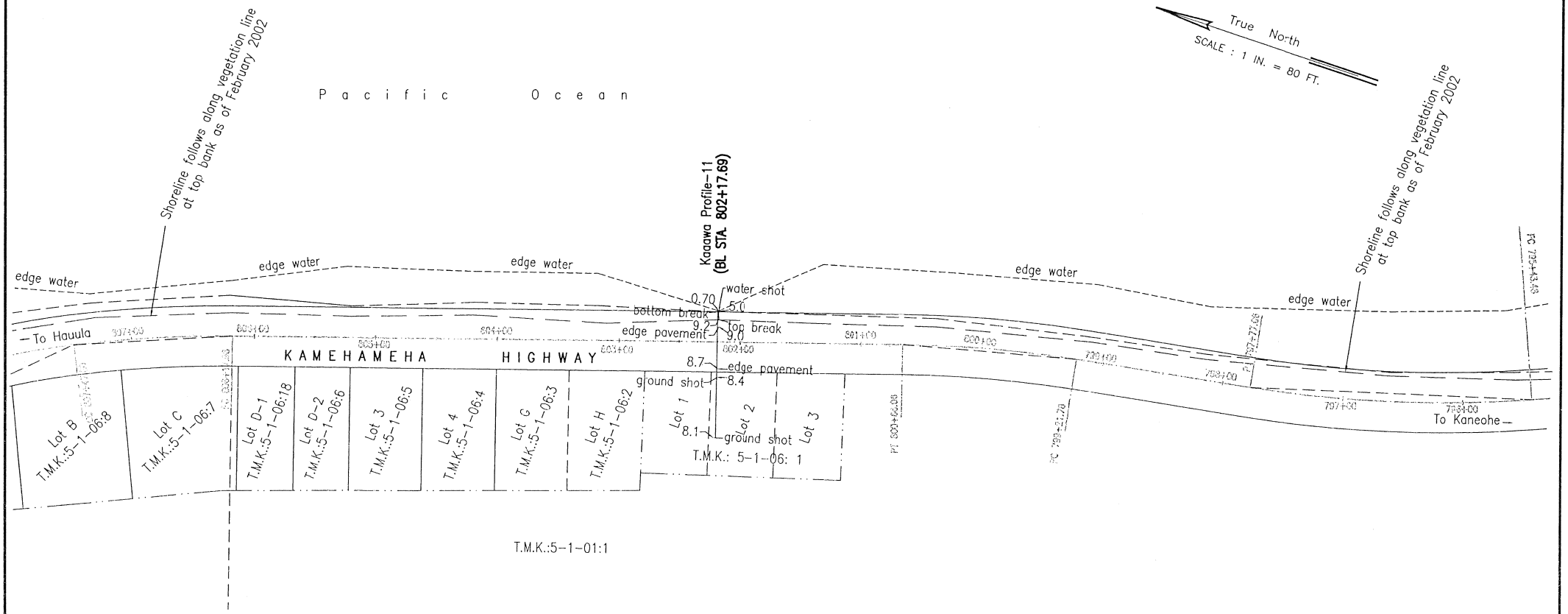
T.M.K. : 5-1-01 and 06

Client : Edward K. Noda and Associates, Inc.

Sheet 7 of 9 Sheets

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Licensed Professional Land Surveyor
Certificate Number 5649



PRELIMINARY

Plan Showing

for State Highway Shoreline Protection
"KAAAWA BEACH 11 and SHORELINE"
at Kaaawa, Koolauloa, Oahu, Hawaii
T.M.K. : 5-1-06

Client : Edward K. Noda and Associates, Inc.

Sheet 8 of 9 Sheets

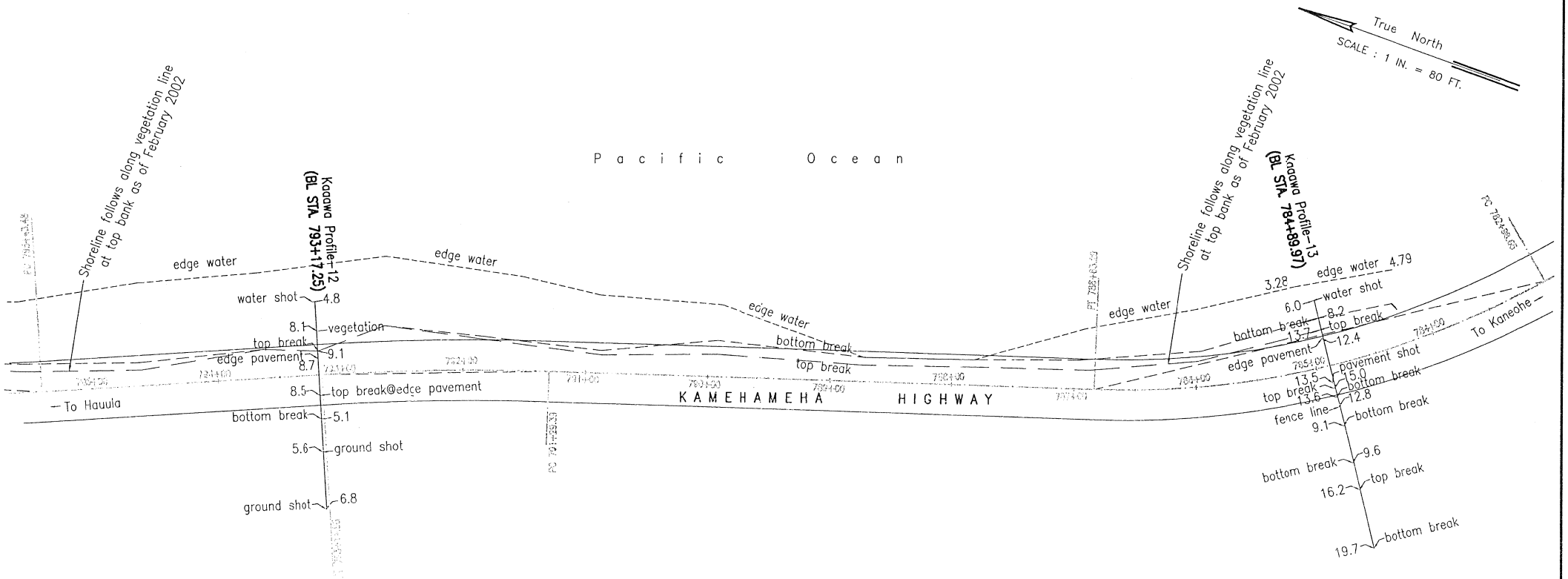
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Honolulu, Hawaii
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ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
June 28, 2002



PRELIMINARY

Plan Showing

for State Highway Shoreline Protection
"KAAAWA BEACH 12 and 13"

at Kaaawa, Koolauloa, Oahu, Hawaii
T.M.K. : 5-1-02 and 10

Client : Edward K. Noda and Associates, Inc.

Sheet 9 of 9 Sheets

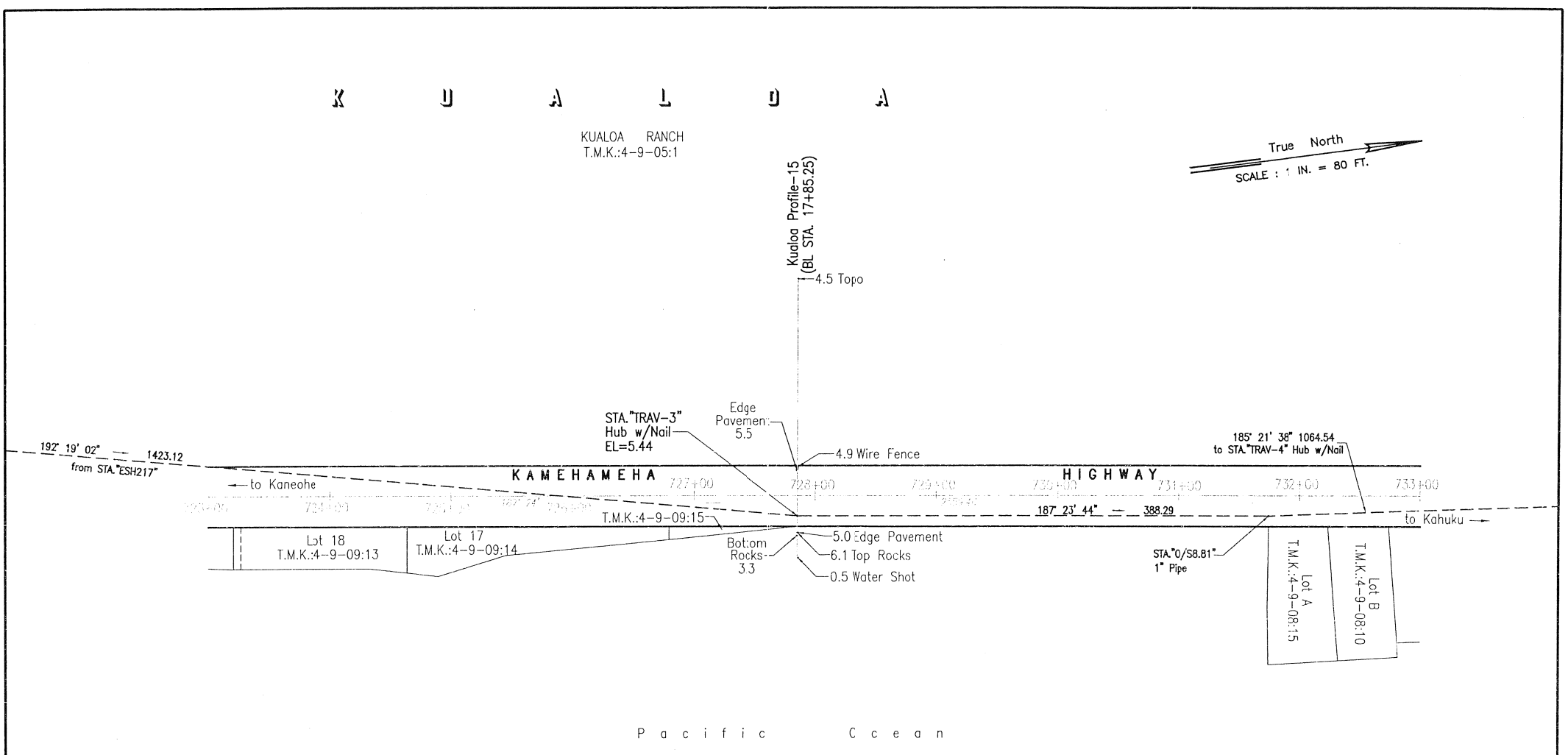
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Certificate Number 5649

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FB: 1291 & 1305
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
June 28, 2002



Plan Showing

portion of Kamehameha Highway
"Kualoa Profile 15"
for State Highway Shoreline Protection
at Kualoa, Koolauloa, Oahu, Hawaii
T.M.K.: 4-9-05, 08 & 09

Client: Edward K. Noda and Associates, Inc.
Sheet 1 of 2

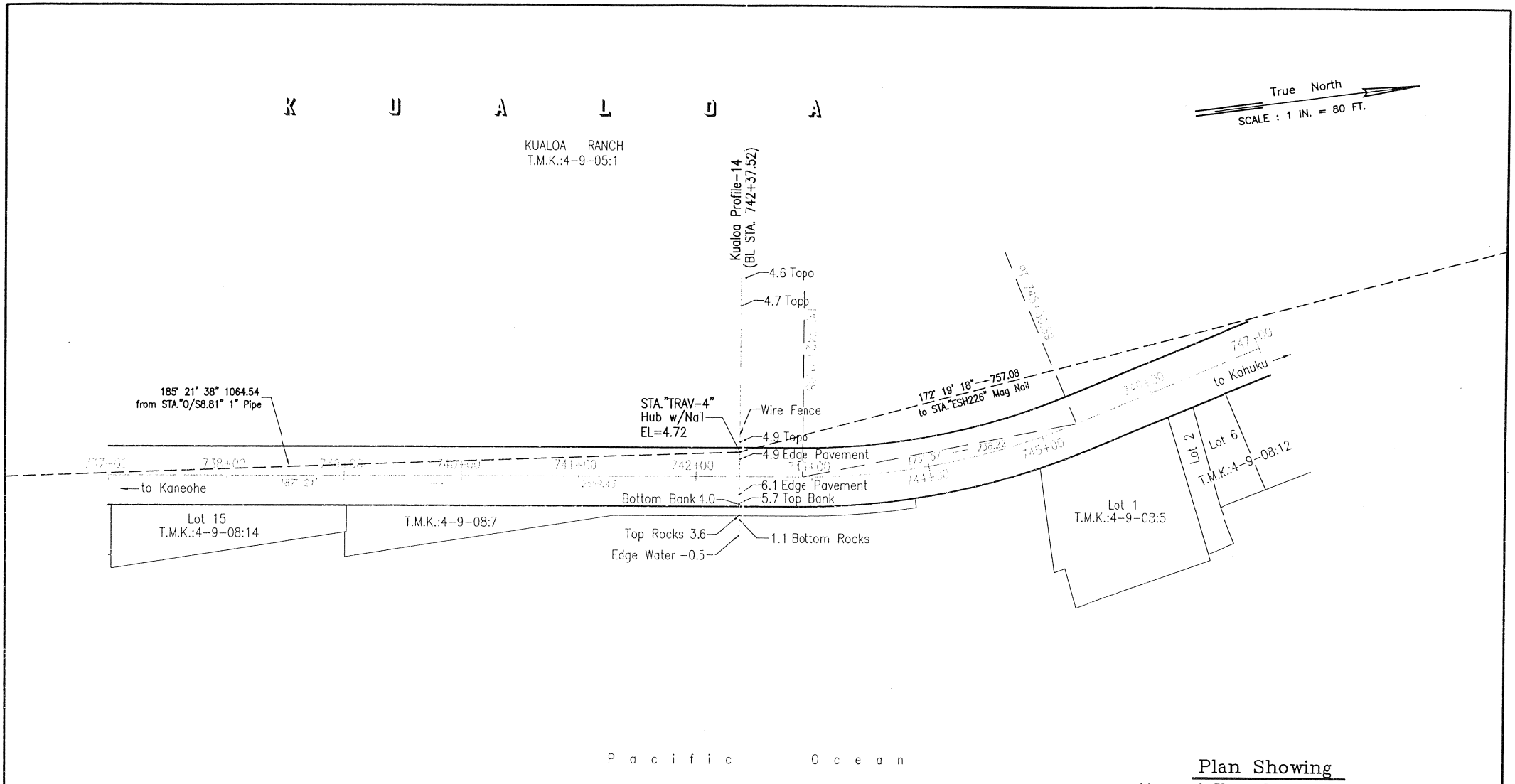
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ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
March 28, 2002



Plan Showing

portion of Kamehameha Highway
"Kualoa Profile 14"
for State Highway Shoreline Protection
at Kualoa, Koolauloa, Oahu, Hawaii
T.M.K: 4-9-05 & 08

Client: Edward K. Noda and Associates, Inc.
Sheet 2 of 2

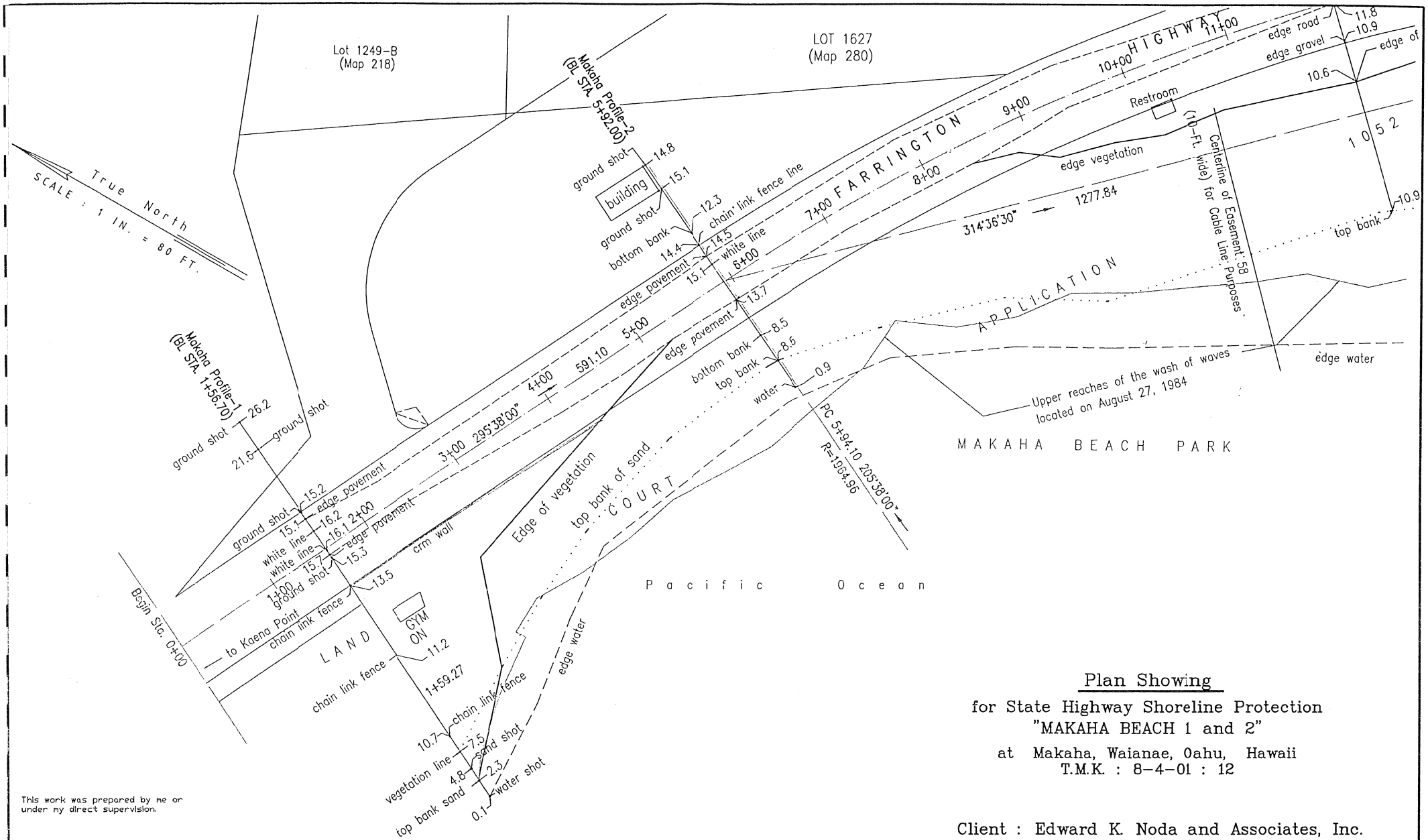
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Certificate Number 5649

Honolulu, Hawaii
FB: 1291 & 1305
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

900 Halekauwila Street
March 28, 2002



Plan Showing

for State Highway Shoreline Protection
"MAKAHA BEACH 1 and 2"
at Makaha, Waianae, Oahu, Hawaii
T.M.K. : 8-4-01 : 12

Client : Edward K. Noda and Associates, Inc.

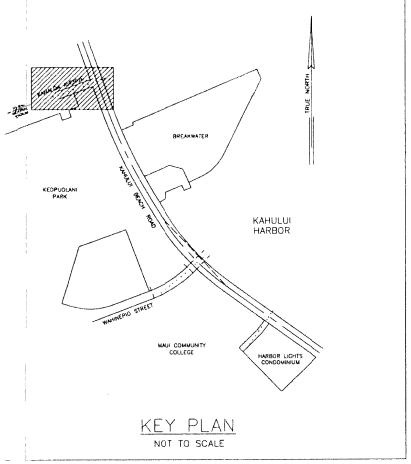
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Kendall N. H. Hee
Licensed Professional Land Surveyor
Certificate Number 5649

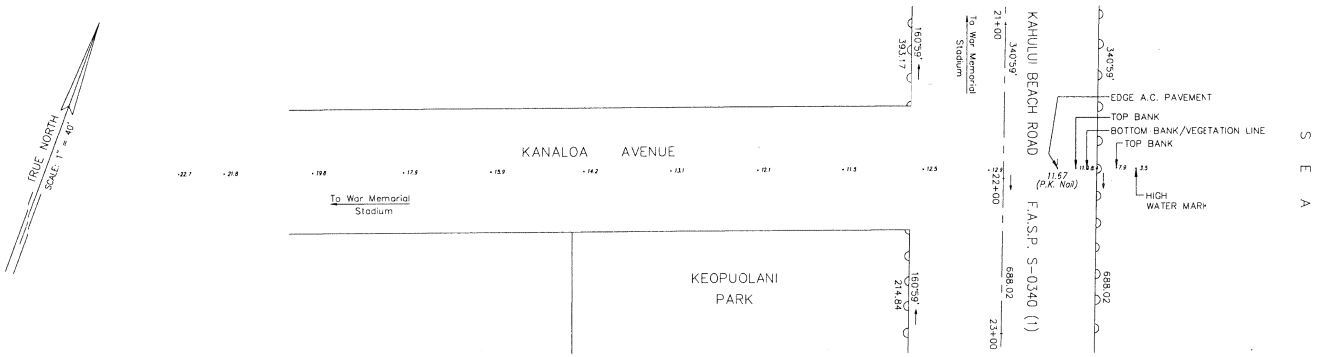
Honolulu, Hawaii
FB: 1111 / pages 22-33
51-100

ENGINEERS SURVEYORS HAWAII, INC.
CIVIL ENGINEERS ~ LAND SURVEYORS ~ CONSTRUCTION MANAGERS

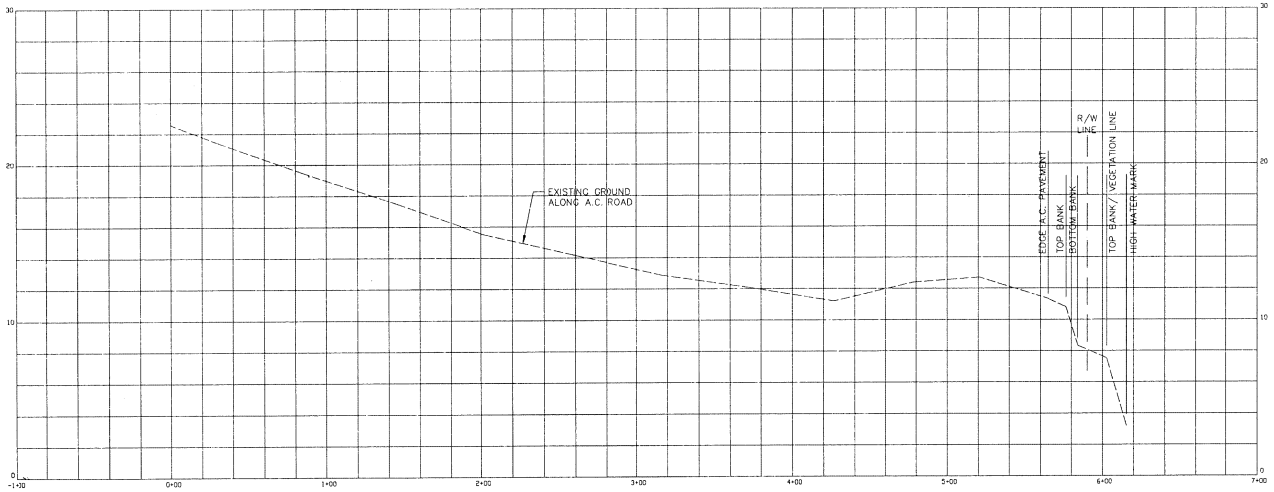
900 Halekauwila Street
June 15, 2002



KEY PLAN
NOT TO SCALE



PLAN
SCALE: 1" = 40'



PROFILE
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

NOTES FOR TOPOGRAPHIC FEATURES:

1. ELEVATION DATUM = MEAN SEA LEVEL.
2. FIELD SURVEY CONDUCTED ON NOVEMBER 08, 2001.

LEGEND AND ABBREVIATIONS:

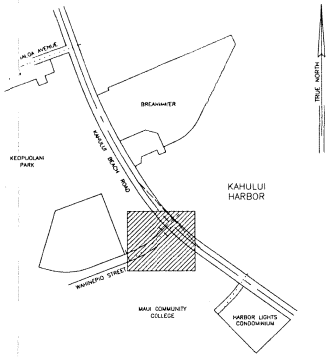
· 9.0	EXISTING SPOT ELEVATION
⁄ 11.67	TRAVERSE STATION WITH ELEVATION

SHORELINE PROFILE MAP
KAHULUI BEACH ROAD AT KAHULUI BAY
AT KAHULUI, MAUI, HAWAII

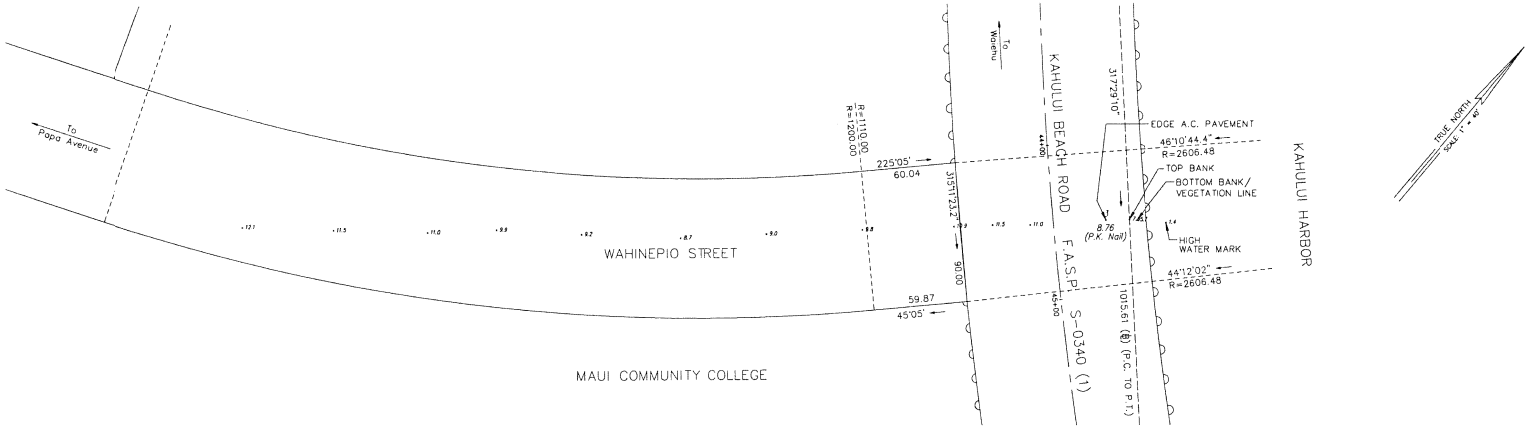
Tax Map Key (2) 3-7-01 & 02

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS
2 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

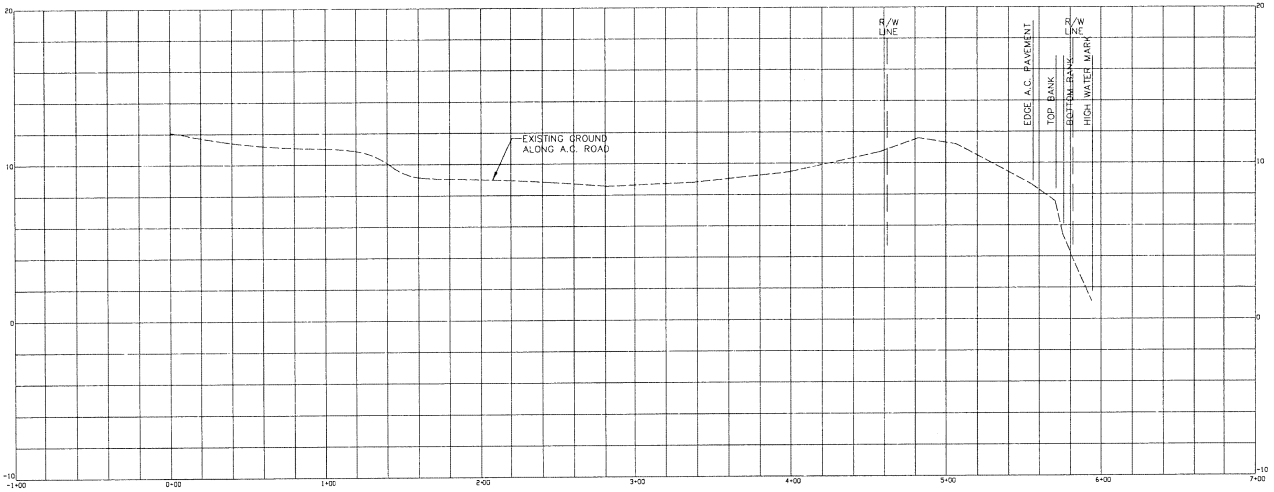
JANUARY 11, 2002



KEY PLAN
NOT TO SCALE



PLAN
SCALE: 1" = 40'



PROFILE
SCALE: HOR: 1" = 40'
VER: 1" = 4'

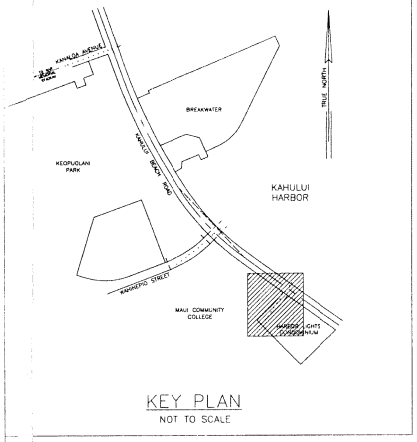
Map Key (2) 3-7-01 & 02

.. KOLU STREET, SUITE 201
ALUKU, MAUI, HAWAII 96793

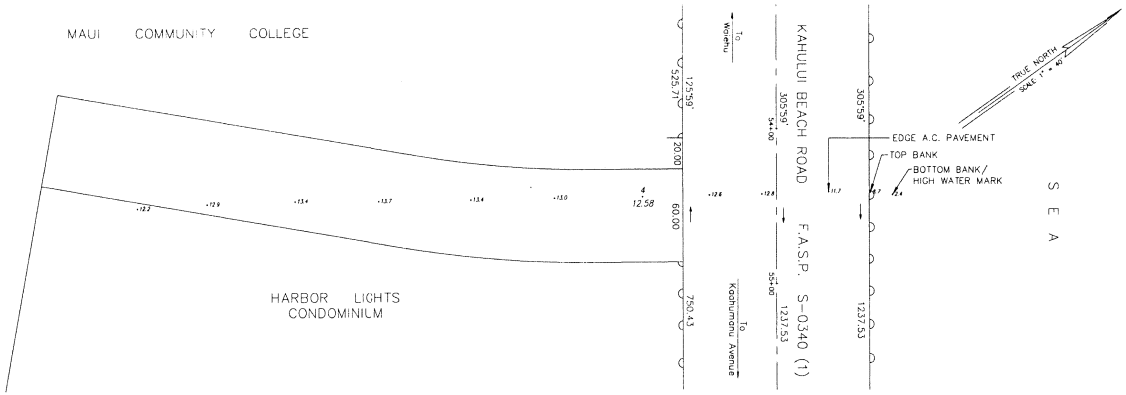
R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

JANUARY 11, 2002

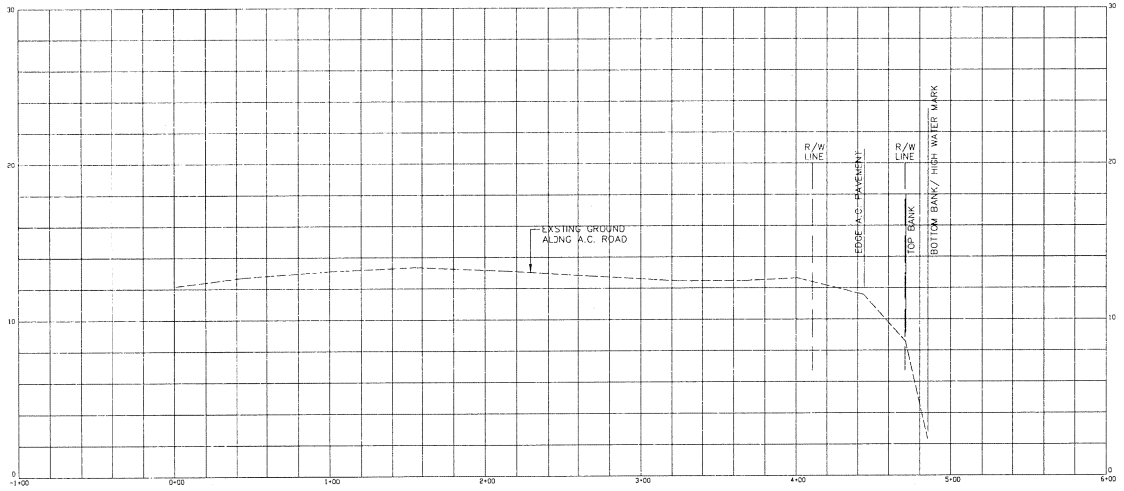
JOB NO. 01-092



KEY PLAN
NOT TO SCALE



PLAN
SCALE: 1" = 40'



PROFILE
SCALE: HOR. 1" = 40'
VER: 1" = 4'

: Map Key (2) 3-7-01 & 02

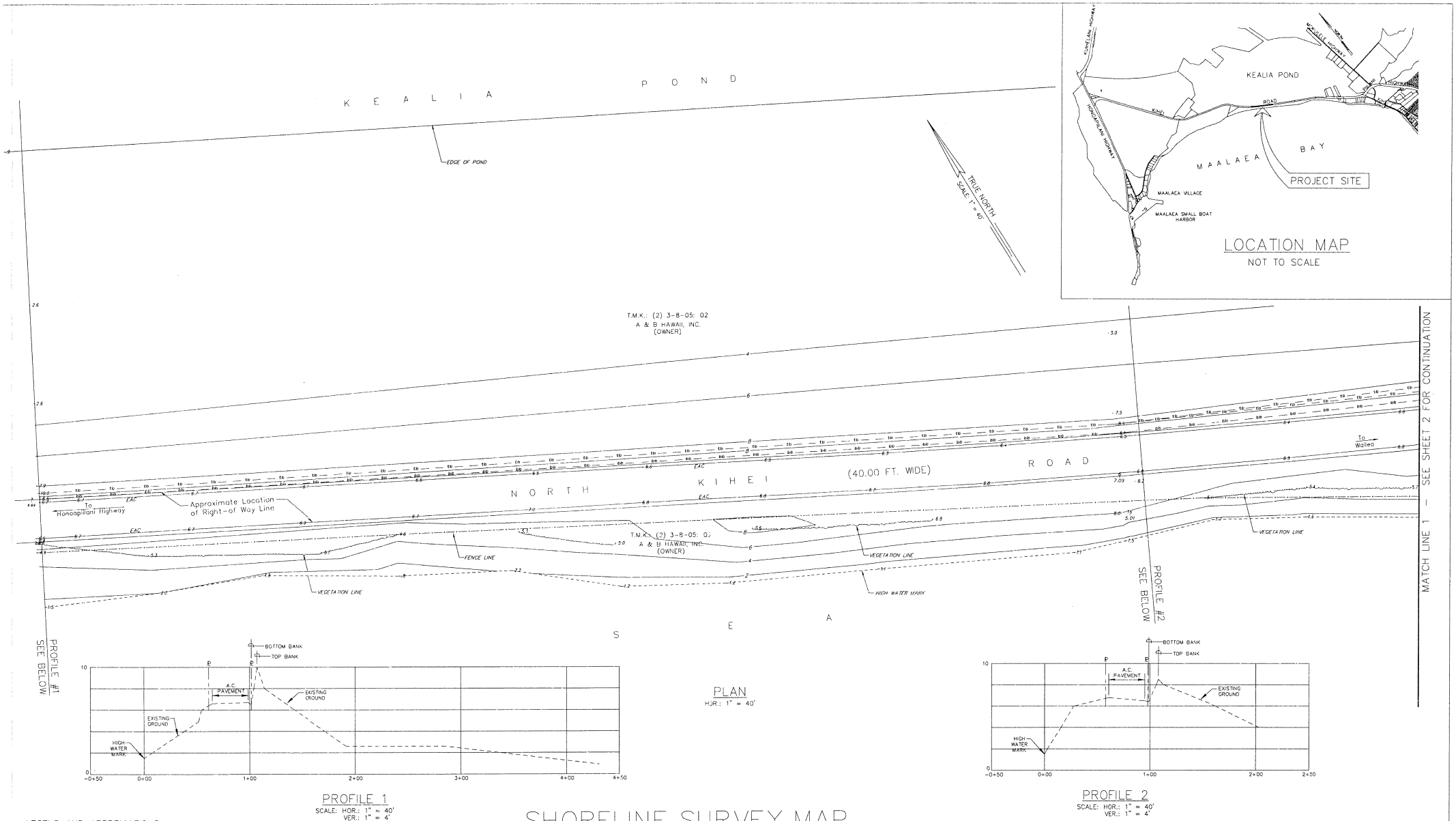
JANUARY 11, 2002

SHEET 3 OF 3 SHEETS

JOB NO. 01-092

KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS



LOCATION MAP
NOT TO SCALE

PLAN
HOR.: 1" = 40'

PROFILE 1
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

PROFILE 2
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

SHORELINE SURVEY MAP
MAALAEA — KEALIA POND AREA
AT MAALAEA, MAUI, HAWAI

40 20 0 40 80
GRAPHIC SCALE IN FEET

LEGEND AND ABBREVIATIONS:

10	CONTOUR
5.3	EXISTING SPOT ELEVATION
6 7.09	TRAVERSE STATION WITH ELEVATION
COTG	CLEANOUT TO GRADE
tb	TOP BANK
bb	BOTTOM BANK
x	CHAINLINK FENCE LINE

NOTES:
1. ELEVATION DATUM = MEAN SEA LEVEL
2. ALL VISIBLE UTILITY STRUCTURES HAVE BEEN LOCATED IN THE RELD, HOWEVER, CONNECTION OF UNDERGROUND UTILITY LINES AS SHOWN ARE UNVERIFIED AND COMPILED FROM EXISTING DATA. UNDERGROUND LTILITIES SHOWN HEREON ARE FOR INFORMATION ONLY, HAVING BEEN OBTAINED FROM THE BEST AVAILABLE SOURCES, BUT FROM OTHERS NOT CONNECTED WITH THIS COMPANY. THEREFORE, NO GUARANTEE IS MADE ON THE ACCURACY OR COMPLETENESS OF SAID INFORMATION.
3. THE TOFOGRAPHIC FIELD SURVEY WAS PERFORMED BETWEEN OCTOBER 2001 AND NOVEMBER 2001.

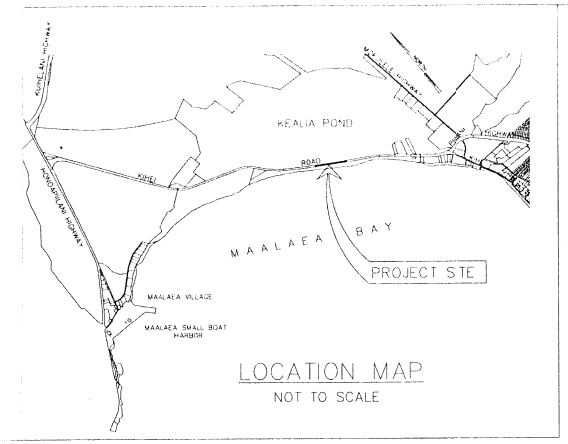
Map Key : (2) 3-8-05

KOLU STREET, SUITE 201
LUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS — CIVIL & STRUCTURAL ENGINEERS

JANUARY 30, 2002

SHEET 1 OF 4 SHEETS
JOB NO. 01-092



LOCATION MAP
NOT TO SCALE

K E A L I A P O N D

EDGE OF POND

TRUE NORTH
SCALE 1" = 40'

T.M.K.: (2) 3-8-05: 02
A & B HAWAII, INC.
(OWNER)

T.M.K.: (2) 3-8-05:03
A & B HAWAII, INC.
(OWNER)

K I H E I R O A D
(40.00 FT. WIDE)

N O R T H

Approximate Location of Right-of Way Line

To Honoapiilani Highway

To Wailea

EAC

FENCE LINE

VEGETATION LINE

HIGH WATER MARK

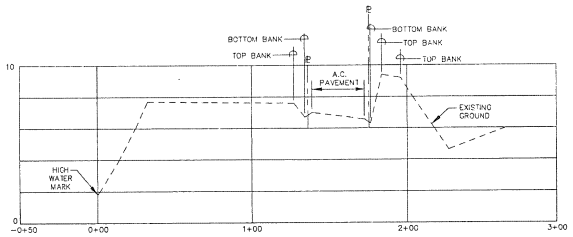
MATCH LINE 1 - SEE SHEET 1 FOR CONTINUATION

MATCH LINE 2 - SEE SHEET 3 FOR CONTINUATION

PROFILE #3 SEE BELOW

S E A

PLAN
HOR.: 1" = 40'



PROFILE 3
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

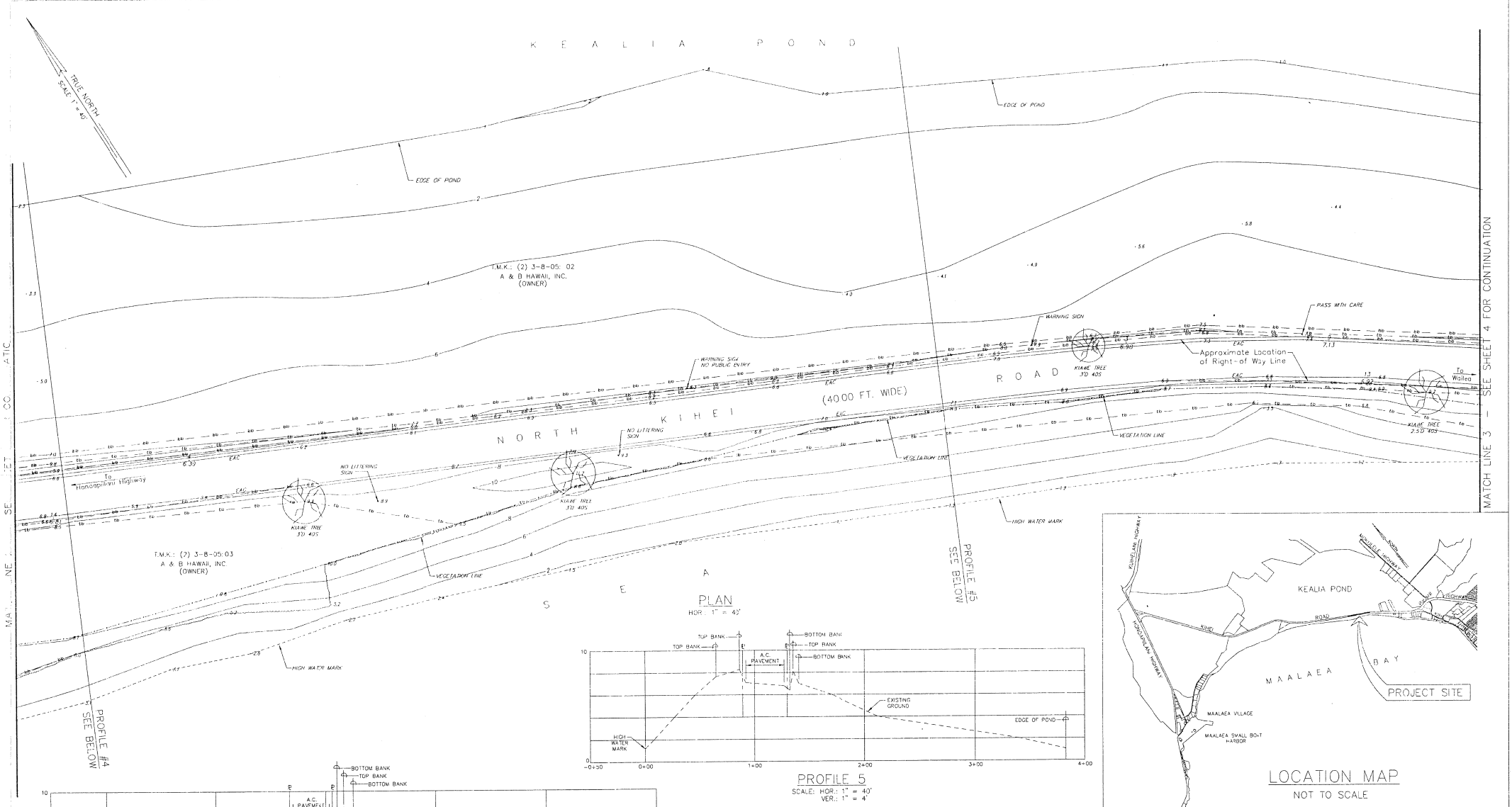
40 20 0 40 80
GRAPHIC SCALE IN FEET

T.M.K.: Map Key (2) 3-8-05

571 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

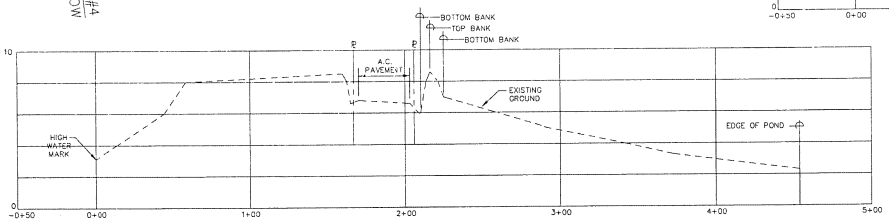
R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

JANUARY 30, 2002



PLAN
HOR.: 1" = 40'

PROFILE 5
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'



PROFILE 4
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

LOCATION MAP
NOT TO SCALE

40 20 0 40 80
GRAPHIC SCALE IN FEET

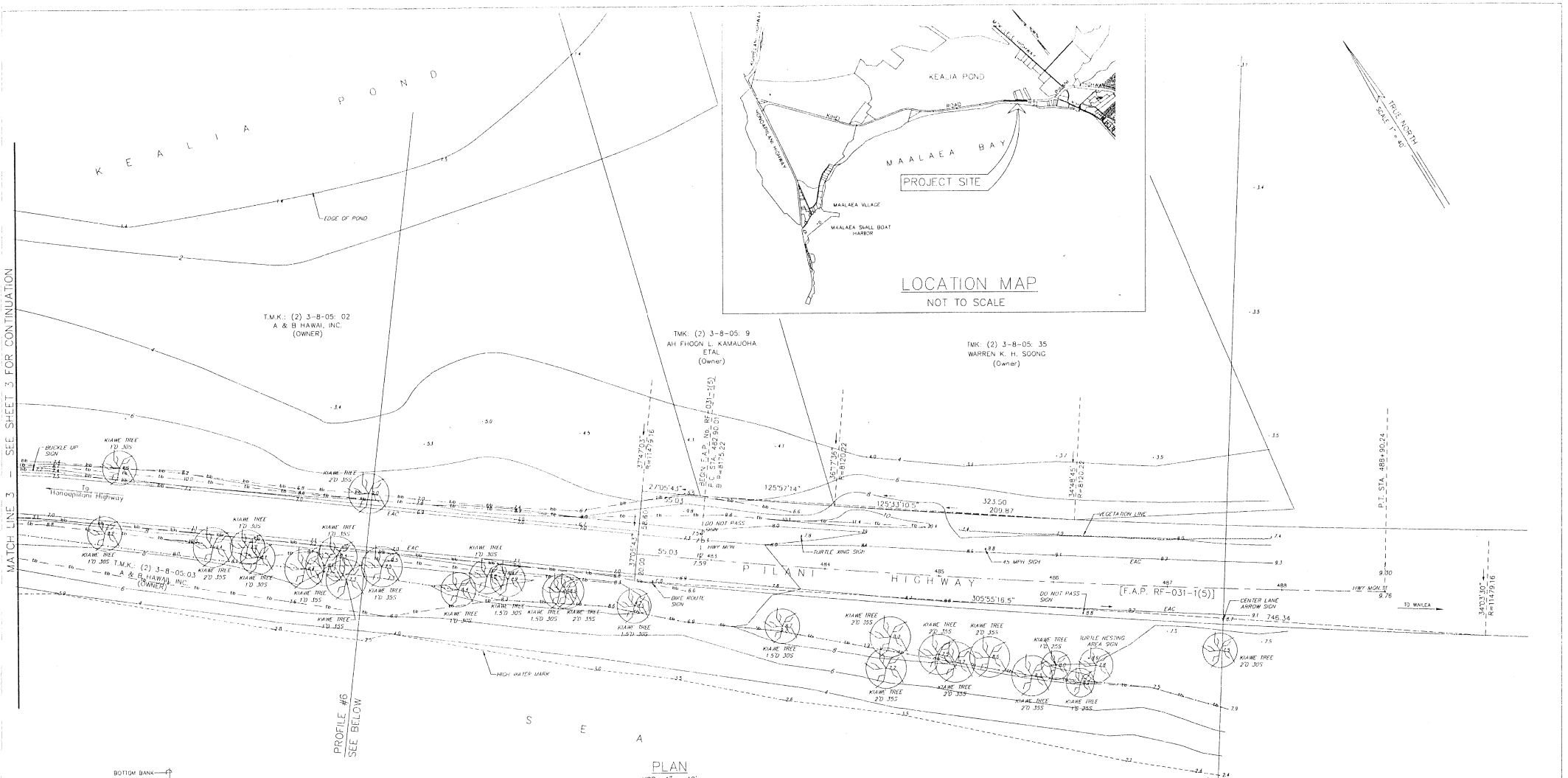
Map Key (2) 3-8-05

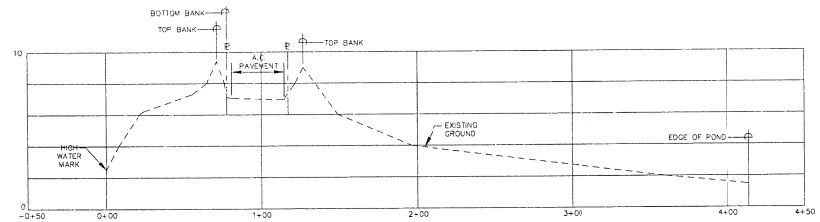
871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

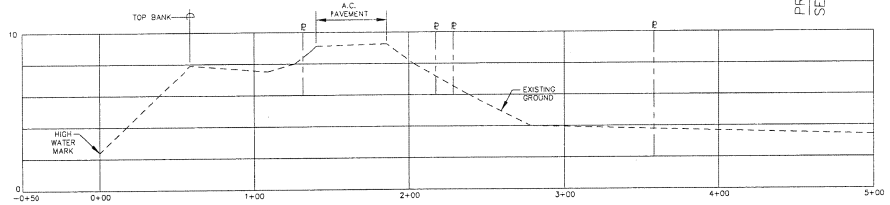
JANUARY 30, 2002

JOB NO. 01-092





PROFILE 6
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'



PROFILE 7
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

40 20 0 40 80
GRAPHIC SCALE IN FEET

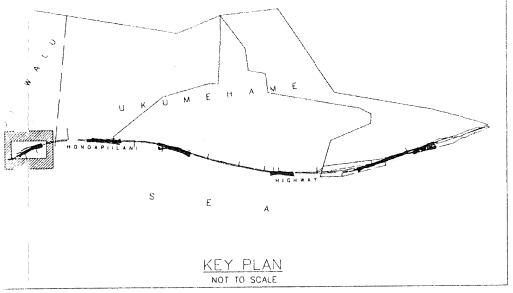
Map Key: (2) 3-8-05

JANUARY 30, 2002

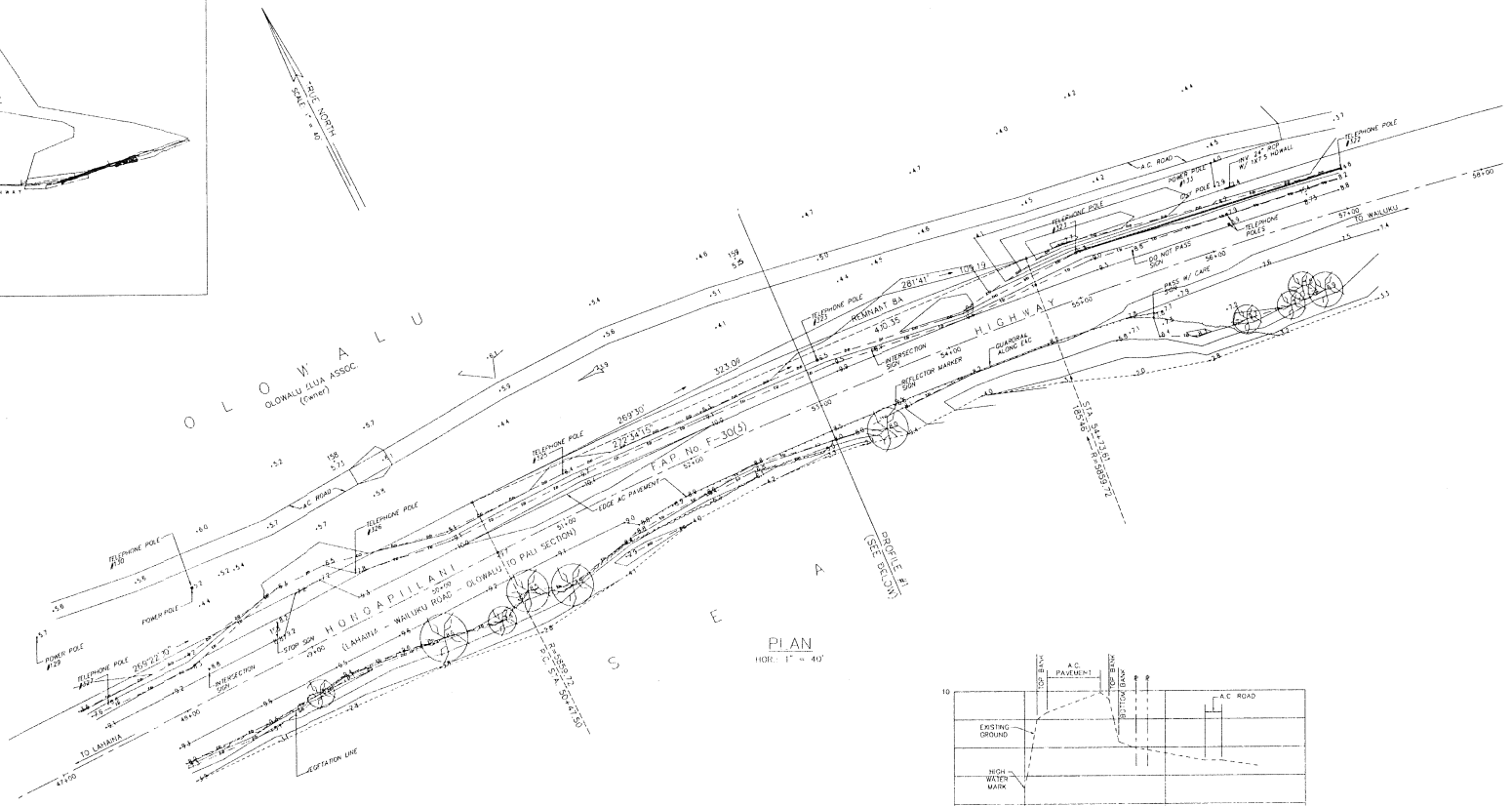
SHEET 4 OF 4 SHEETS

JOB NO. 01-092

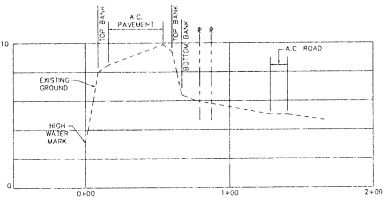
R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS
871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793



KEY PLAN
NOT TO SCALE



PLAN
HOR: 1" = 40'



PROFILE 1
SCALE: HOR: 1" = 40'
VER: 1" = 4'

NOTES FOR TOPOGRAPHIC FEATURES:

1. ELEVATION DATUM = MEAN SEA LEVEL.
2. FIELD SURVEY CONDUCTED ON OCTOBER 05, 2001.

LEGEND AND ABBREVIATIONS:

10	CONTOUR
6.0	EXISTING SPOT ELEVATION
156 8.9	TRAVERSE STATION WITH ELEVATION
EAC	EDGE AC PAVEMENT
G G G G G G	GUARDRAIL
TB	TOP BANK
BB	BOTTOM BANK
	COCONUT TREE
	MONKEY POD TREE
	OPLOMA TREE
	KIAWE TREE
	MP - TREE

SHORELINE SURVEY MAP
OLOWALU - UKUMEHAME SECTION
AT LAHAINA, MAUI, HAWAII

40 20 0 40 80
GRAPHIC SCALE IN FEET

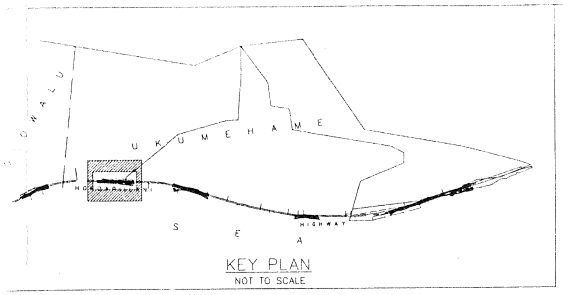
JANUARY 30, 2002

SHEET 1 OF 6 SHEETS
JOB NO. 01-092

T: Map Key: (2) 4-8-03
&
W
KOLU STREET, SUITE 201
JKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

LEGEND AND ABBREVIATIONS:

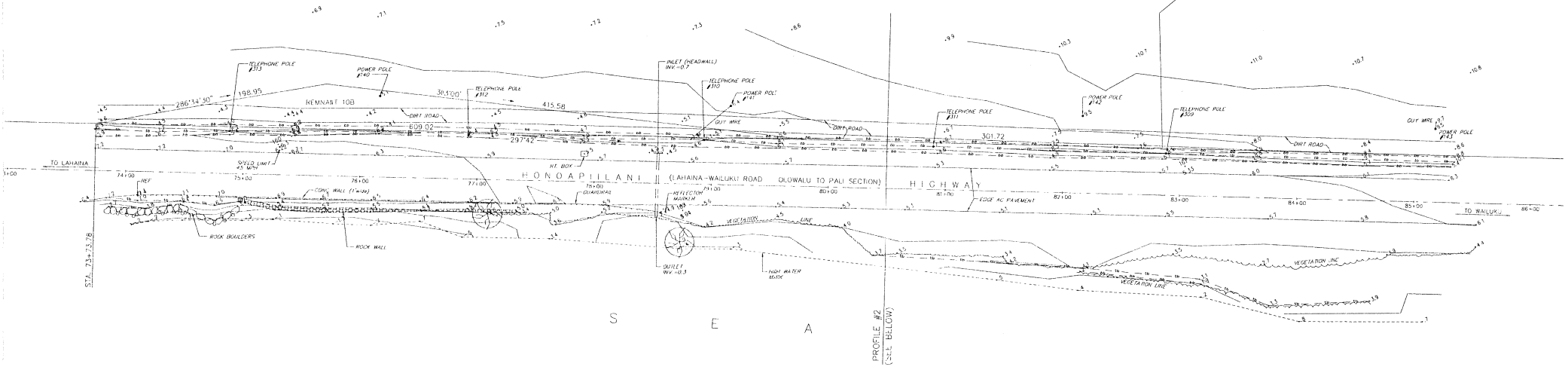


KEY PLAN
NOT TO SCALE

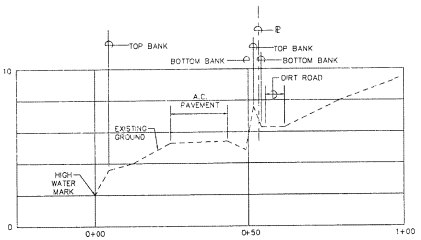
TRUE NORTH
SCALE 1" = 40'

STATE OF HAWAII
(Owner)

TMK (2) 4-8-02: 70
JOHN M. & JULIE A. KEAN, Etal.
(Owners)



PLAN
HOR.: 1" = 40'



PROFILE 2
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

40 20 0 40 80
GRAPHIC SCALE IN FEET

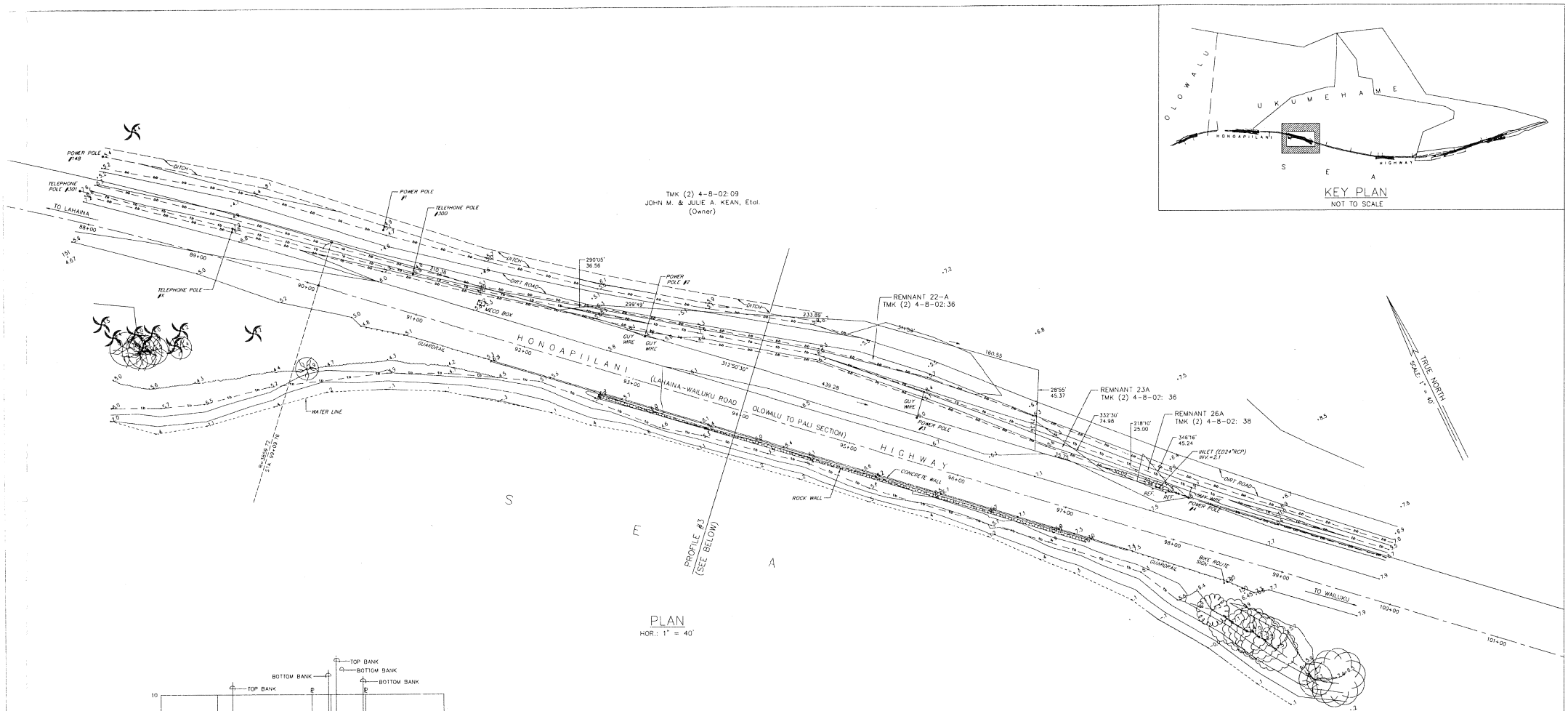
Map Key: (2) 4-8-02

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

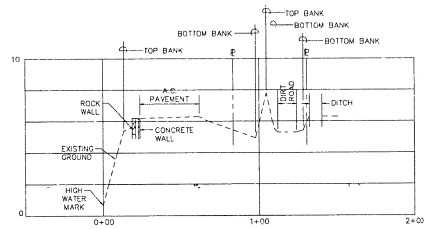
R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

JANUARY 30, 2002

JOB NO. 01-092



PLAN
HOR.: 1" = 40'



PROFILE 3
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

KEY PLAN
NOT TO SCALE

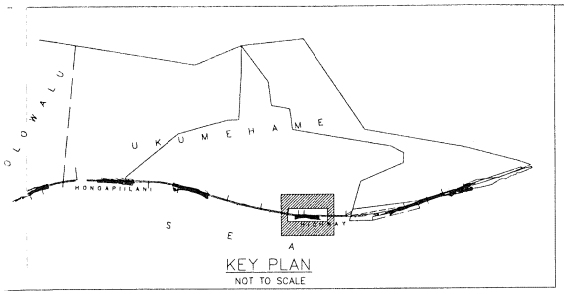
40 20 0 40 80
GRAPHIC SCALE IN FEET

Map Key: (2) 4-8-02

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS – CIVIL & STRUCTURAL ENGINEERS

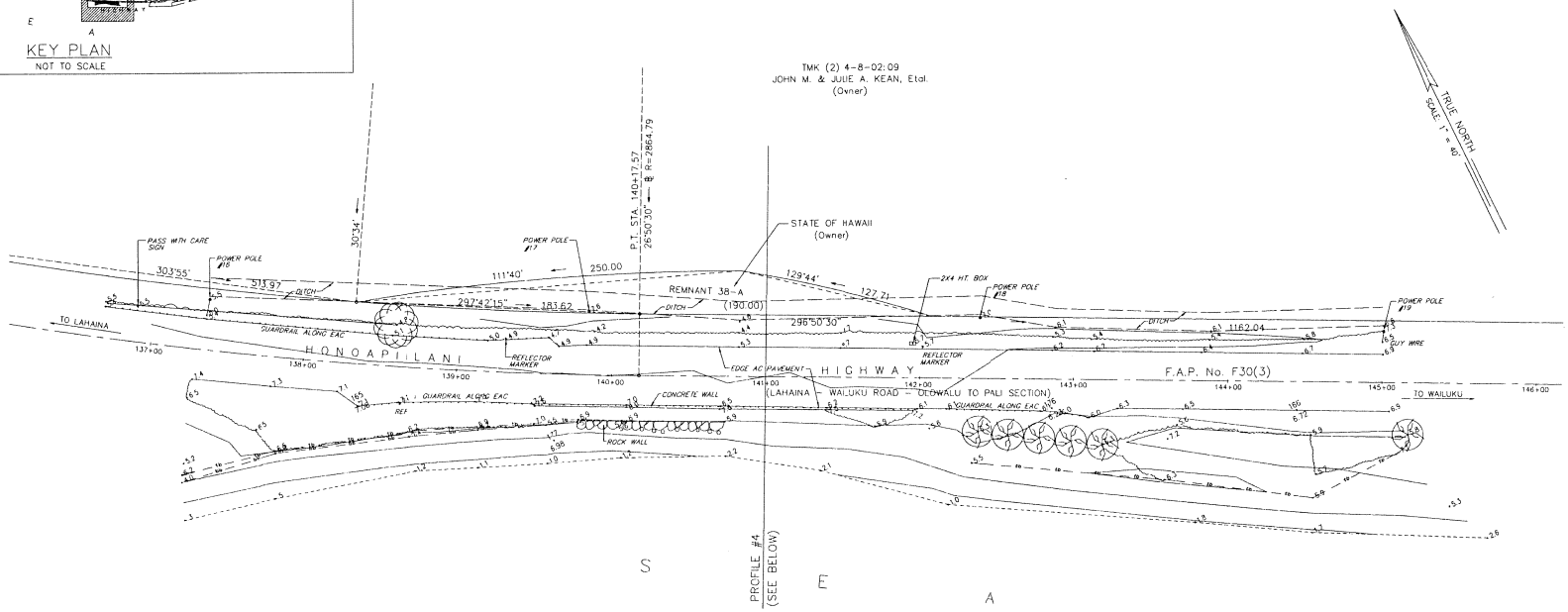
JANUARY 30, 2002



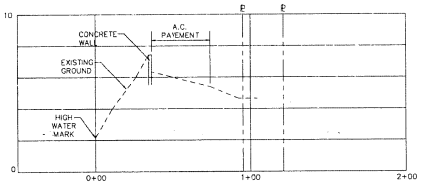
KEY PLAN
NOT TO SCALE

TMK (2) 4-8-02:09
JOHN M. & JULIE A. KEAN, Etal.
(Owner)

TRUE NORTH
SCALE: 1" = 40'



PLAN
HOR.: 1" = 40'



PROFILE 4
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

40 20 0 40 80
GRAPHIC SCALE IN FEET

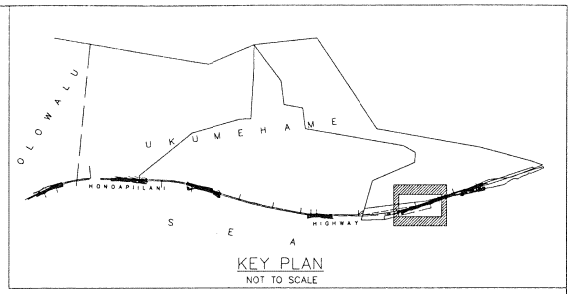
Map Key: (2) 4-8-02

811 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

JANUARY 30, 2002

SHEET 4 OF 6 SHEETS
JOB NO. 01-092



KEY PLAN
NOT TO SCALE

TRUE NORTH
SCALE 1" = 40'

289°05'
1990.20
279°46'
1285.54
286°25'30"
1745.96
277°38'
1631.50
3968.62
102°50'30.5"
1078.38
97°32'30"
450.00
97°36'
3522.47
101°52'
1564.16
132.87'
137.88'
R = 5729.58
P.T. STA. 172+93.78

TMK (2) 4-8-02:47
Owner: STATE OF HAWAII

INV. 24" RCP W/ 1'X7.5 HDWALL
POWER POLE #28
GUY WIRE
POWER POLE #29
4'X8' HT-BOX
TELEPHONE POLE #30
PHONE BOX
POWER POLE #31
VEGETATION LINE
POWER POLE #32
REFLECTOR MARKER
TOP 24" RCP (COVERED)
POWER POLE #33
TO LAHAINA
TO WAILUKU
EDGE A.C. PAVEMENT
SPEED LIMIT 45 / 55 MPH
SPEED LIMIT 55 / 45 MPH
GUARDRAIL
ROCK WALL
CONCRETE WALL
HONOAPIILANI
HIGHWAY
F.A.P. No. F30(3)
(LAHAINA - WAILUKU ROAD - OLOWALU TO PALI SECTION)
SAND & DEBRIS SIGN
168+00
169+00
170+00
171+00
172+00
173+00
174+00
175+00
176+00
177+00
178+00
179+00
180+00

MATCH LINE SEE SHT. 6 FOR CONTINUATION

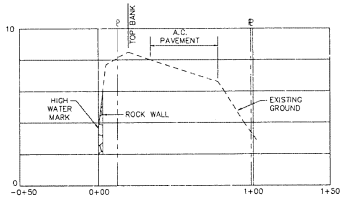
UKUMEHAME BEACH PARK
EXECUTIVE ORDER NO. 1077
TMK (2) 4-8-02:31
Owner: STATE OF HAWAII
(County of Maui)

HIGH WATER MARK AS OF DECEMBER 1949

PROFILE #5 (SEE BELOW)

S E A

PLAN
HOR.: 1" = 40'



PROFILE 5
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

40 20 0 40 80
GRAPHIC SCALE IN FEET

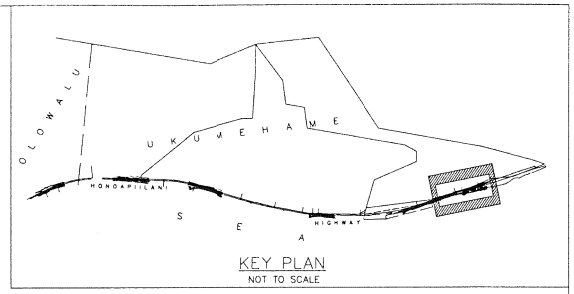
Tax Map Key: (2) 4-8-02

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

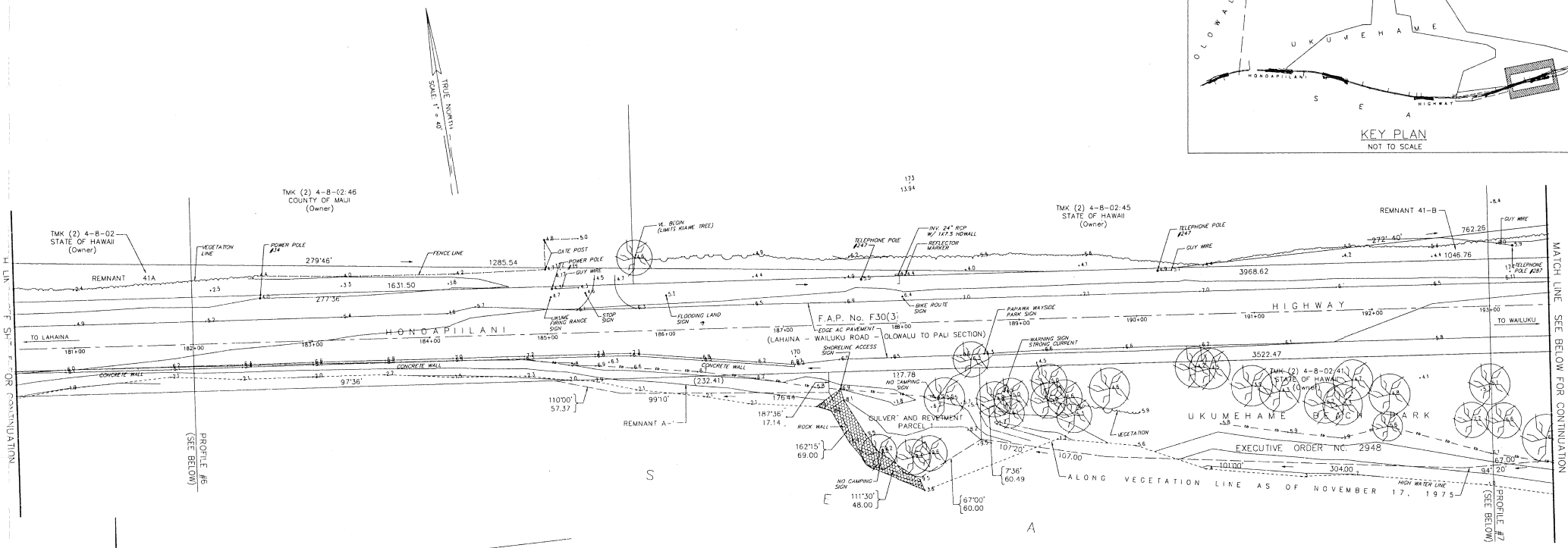
R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

JANUARY 30, 2002

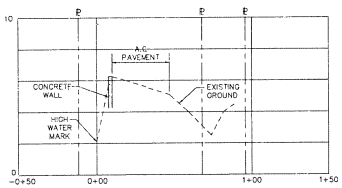
SHEET 5 OF 6 SHEETS
JOB NO. 01-092



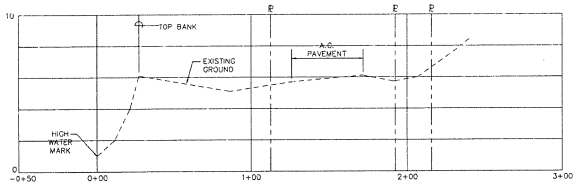
KEY PLAN
NOT TO SCALE



PLAN
HOR.: 1" = 40'



PROFILE 6
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'



PROFILE 7
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'

40 20 0 40 80
GRAPHIC SCALE IN FEET

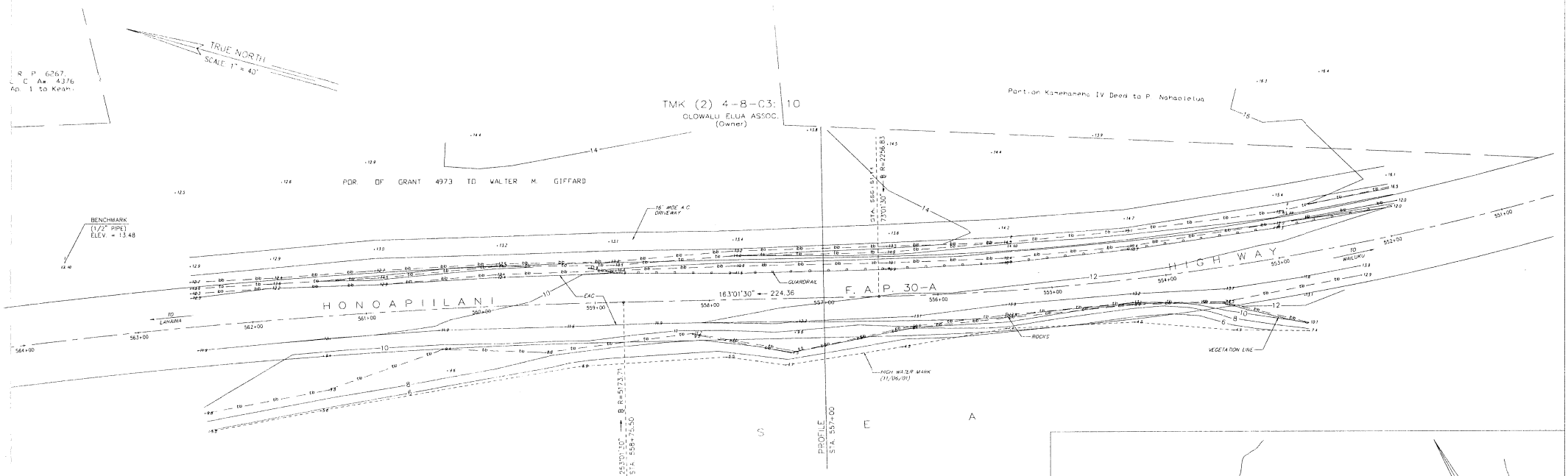
T Map Key: (2) 4-8-02

571 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

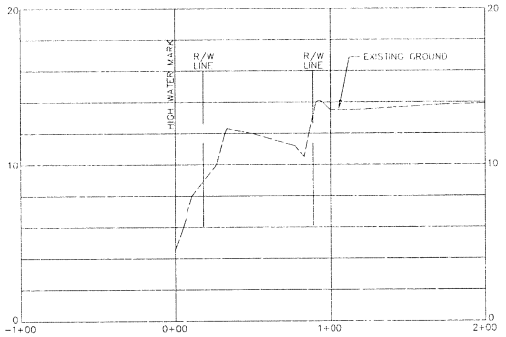
R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

JANUARY 30, 2002

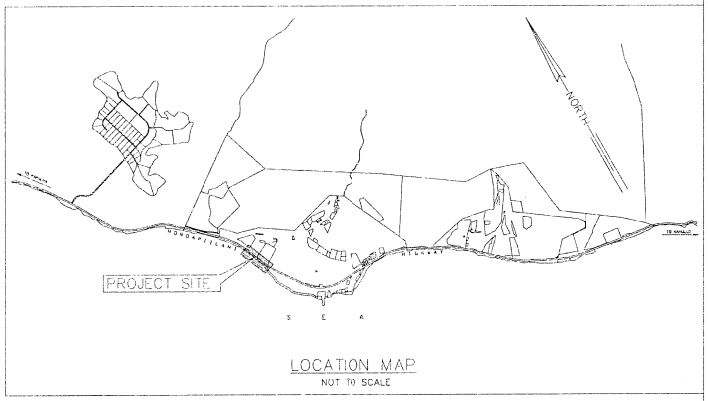
SHEET 6 OF 6 SHEETS
JOB NO. 01-092



PLAN
SCALE: 1" = 40'



PROFILE
SCALE: HOR.: 1" = 40'
VER.: 1" = 4'



LOCATION MAP
NOT TO SCALE

NOTES FOR TOPOGRAPHIC FEATURES:

1. ELEVATION DATUM = MEAN SEA LEVEL.
2. FIELD SURVEY CONDUCTED ON NOVEMBER 06, 2001.

LEGEND AND ABBREVIATIONS:

10	CONTOUR
+6.0	EXISTING SPOT ELEVATION
156 / 8.9	TRAVERSE STATION WITH ELEVATION
EAC	EDGE AC PAVEMENT
	GUARDRAIL
tb	TOP BANK
bb	BOTTOM BANK

40 20 0 40 80
GRAPHIC SCALE IN FEET

TOPOGRAPHIC SURVEY MAP

OF A PORTION OF THE

HONOAPIILANI HIGHWAY AT OLOWALU

AT LAHAINA, MAUI, HAWAII

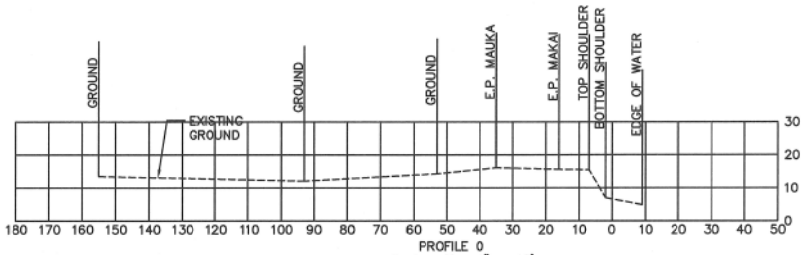
NOTES FOR TOPOGRAPHIC FEATURES:

1. ELEVATION DATUM = MEAN SEA LEVEL.
2. ALL VISIBLE UTILITY STRUCTURES HAVE BEEN LOCATED IN THE FIELD, HOWEVER, CONNECTION OF UNDERGROUND UTILITY LINES AS SHOWN ARE UNVERIFIED AND COMPILED FROM EXISTING DATA. UNDERGROUND UTILITIES SHOWN HEREON ARE FOR INFORMATION ONLY. HAVING BEEN OBTAINED FROM THE BEST AVAILABLE SOURCES, BUT FROM OTHERS NOT CONNECTED WITH THIS COMPANY. THEREFORE, NO GUARANTEE IS MADE ON THE ACCURACY OR COMPLETENESS OF SAID INFORMATION.

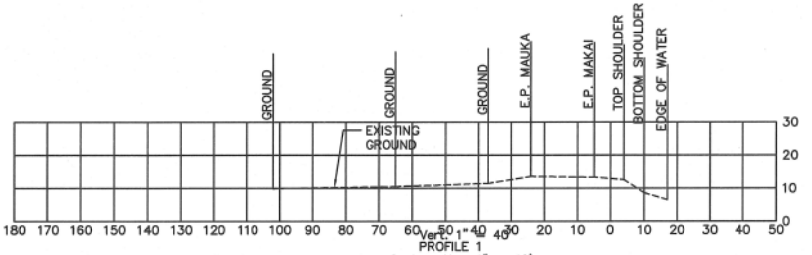
Map Key (2) 4-8-03

JANUARY 11, 2002
JOB NO. 01-092

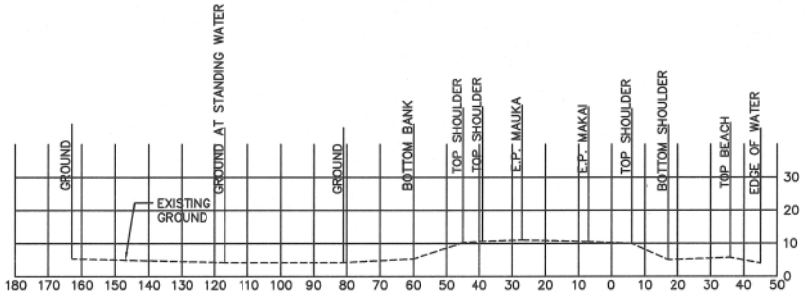
R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS
[illegible] KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793



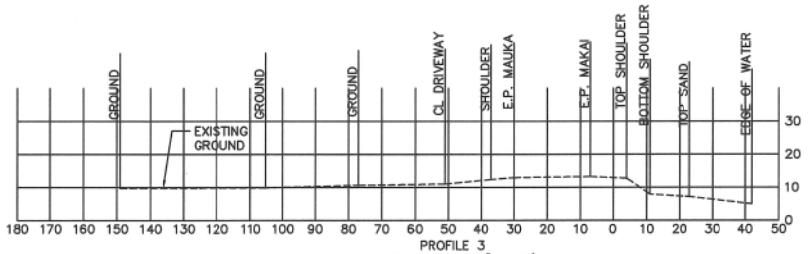
PROFILE 0
Scale: Hor. 1" = 40'
Vert. 1" = 40'



PROFILE 1
Scale: Hor. 1" = 40'
Vert. 1" = 40'



PROFILE 2
Scale: Hor. 1" = 40'
Vert. 1" = 40'



PROFILE 3
Scale: Hor. 1" = 40'
Vert. 1" = 40'

NOTES
Profiles were drawn from a ground survey conducted on August 20, 2002 by EKNA personnel. Datum is mean sea level.



ROUTE 560 AT HANALEI, KAUAI

7 - COST ESTIMATES FOR ALTERNATIVE PLANS

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

OAHU: Kamehameha Highway at Kawailoa

New 60 ft R/W roadway 3,200 LF, replace Lauhulu Bridge, extend Pohaku Loa Way 100 LF with Kamehameha Hwy.

CONSTRUCTION	Qty.	Units	Unit Cost	Total Cost	
New roadway	3,200	LF	$900	$2,880,000	
New 70 ft. Lauhulu Bridge/crossing	70	LF	$26,000	$1,820,000	
Extend Pohaku Loa St.	100	LF	$900	$90,000	
T Intersection at Kamehameha Hwy	2	EA	$30,000	$60,000	
Remove Pavement	1,000	LF	$15	$15,000	
Mobilization	FA	FA		$486,500	
Traffic Control	FA	FA		$243,300	
Environmental Controls	FA	FA		$121,600	
			Estimated Construction Cost Total =	$5,716,400	a
			Contingencies (5%*a) =	$285,800	b
			Construction Engineering (15%*(a+b)) =	$900,300	c
			Administration Non-participating (40%*c) =	$360,100	
TOTAL CONSTRUCTION				**$7,262,600**	
PLANNING & PERMITTING (15%*a)				**$857,500**	
ENGINEERING & DESIGN (15%*a)				**$857,500**	
R/W ACQUISITION, 3200 LF x 60'				**$100,000**	
TOTAL COST FOR ALTERNATIVE				**$9,077,600**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

Signalized T intersection cost is estimated

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: KAWAILOA BEACH FILL

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
ARMOR	0	CY/LF	1.6	TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0	CY/LF	1.7	TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0	SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL										$0
METAL GUARDRAIL					800	LF	$60.00	$48,000	20%	$57,600
BEACH FILL										
BEACH SAND FILL					10,370	CY	$35.00	$362,950	20%	$435,500
GROINS/BW	570	CY	1.6	TN/CY	912	TNS	$85.00	$77,520	20%	$93,000
BEACH FILL TOTAL										$528,500
SEAWALL	800	LF								
EXCAVATION/BACKFILL	0.3	CY/LF			240	CY	$25.00	$6,000	20%	$7,200
CRM WALL	17	CF/LF			13,600	CF	$19.50	$265,200	20%	$318,200
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$325,400
GENERAL REQUIREMENTS										
MOBILIZATION										$85,400
TRAFFIC CONTROL					FA	FA				$42,700
ENVIRONMENTAL CONTROLS					FA	FA				$170,800
TOTAL FOR ALTERNATIVE PLAN									a	$1,210,400
CONTINGENCIES					5% *a				b	$60,500
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$190,600
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$76,200
TOTAL CONSTRUCTION										**$1,537,700**
PLANNING & PERMITTING (15%*a)										**$181,600**
ENGINEERING & DESIGN (15%*a)										**$181,600**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$1,900,900**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: KAWAILOA REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	800	LF								
EXCAVATION/BACKFILL	3	CY/LF			2,400	CY	$25.00	$60,000	20%	$72,000
ARMOR	2.4	CY/LF	1.6	TN/CY	3,072	TNS	$70.00	$215,040	20%	$258,000
UNDERLAYER	2.3	CY/LF	1.7	TN/CY	3,128	TNS	$60.00	$187,680	20%	$225,200
FILTER FABRIC	32	SF/LF			25,600	SF	$0.45	$11,520	20%	$13,800
REVETMENT TOTAL										$569,000
METAL GUARDRAIL					800	LF	$60.00	$48,000	20%	$57,600
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$56,900
TRAFFIC CONTROL					FA	FA				$28,500
ENVIRONMENTAL CONTROLS					FA	FA				$113,800
TOTAL FOR ALTERNATIVE PLAN									a	$825,800
CONTINGENCIES					5% *a				b	$41,300
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$130,100
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$52,000
TOTAL CONSTRUCTION										**$1,049,200**
PLANNING & PERMITTING (15%*a)										**$123,900**
ENGINEERING & DESIGN (15%*a)										**$123,900**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$1,297,000**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: KAWAILOA CRM WALL

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
ARMOR	0	CY/LF	1.6	TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0	CY/LF	1.7	TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0	SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL										$0
METAL GUARDRAIL					800	LF	$60.00	$48,000	20%	$57,600
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	800	LF								
EXCAVATION/BACKFILL	0.7	CY/LF			560	CY	$25.00	$14,000	20%	$16,800
CRM WALL	34	CF/LF			27,200	CF	$19.50	$530,400	20%	$636,500
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0.3	CY/LF			240	CY	$75.00	$18,000	20%	$21,600
TOTAL SEAWALL										$674,900
GENERAL REQUIREMENTS										
MOBILIZATION										$67,500
TRAFFIC CONTROL					FA	FA				$33,700
ENVIRONMENTAL CONTROLS					FA	FA				$135,000
TOTAL FOR ALTERNATIVE PLAN									a	$968,700
CONTINGENCIES					5% *a				b	$48,400
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$152,600
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$61,000
TOTAL CONSTRUCTION										**$1,230,700**
PLANNING & PERMITTING (15%*a)										**$145,300**
ENGINEERING & DESIGN (15%*a)										**$145,300**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$1,521,300**

Note that the cost for Administration has been changed to "partcipating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: HAUULA REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	2,250	LF								
EXCAVATION/BACKFILL	2.6	CY/LF			5,850	CY	$25.00	$146,250	20%	$175,500
ARMOR	3.8	CY/LF	1.6	TN/CY	13,680	TNS	$70.00	$957,600	20%	$1,149,100
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	13,388	TNS	$60.00	$803,280	20%	$963,900
FILTER FABRIC	40	SF/LF			90,000	SF	$0.45	$40,500	20%	$48,600
REVETMENT TOTAL										$2,337,100
METAL GUARDRAIL					2,250	LF	$60.00	$135,000	20%	$162,000
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$233,700
TRAFFIC CONTROL					FA	FA				$116,900
ENVIRONMENTAL CONTROLS					FA	FA				$467,400
TOTAL FOR ALTERNATIVE PLAN									a	$3,317,100
CONTINGENCIES					5% *a				b	$165,900
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$522,500
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$209,000
TOTAL CONSTRUCTION										**$4,214,500**
PLANNING & PERMITTING (15%*a)										**$497,600**
ENGINEERING & DESIGN (15%*a)										**$497,600**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										$5,209,700

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

OAHU: Kamehameha Highway at Hau'ula

New 50 ft R/W roadway 5,300 LF, T intersections at Pokiwai Place, unnamed road, Kamehameha Highway (twice); new Waipuhi, Maheiwi, Waimanana and Kaluanui Stream crossings.

CONSTRUCTION	Qty.	Units	Unit Cost	Total Cost	
New roadway	5,300	LF	$900	$4,770,000	
New 24 ft. Waipuhi Bridge	24	LF	$26,000	$624,000	
New 54 ft. Maheiwi Bridge (two crossings)	110	LF	$26,000	$2,860,000	
New 72 ft. Waimanana Bridge	72	LF	$26,000	$1,872,000	
New 126 ft. Kaluanui Stream crossing	126	LF	$26,000	$3,276,000	
New culvert crossings	3	EA	$75,000	$225,000	
T Intersections with Pokiwai Pl., unnamed Rd.	4	EA	$30,000	$120,000	
Mobilization	FA	FA		$1,374,700	
Traffic Control	FA	FA		$687,400	
Environmental Controls	FA	FA		$343,700	
			Estimated Construction Cost Total =	$16,152,800	a
			Contingencies (5%*a) =	$807,600	b
			Construction Engineering (15%*(a+b)) =	$2,544,100	c
			Administration Non-participating (40%*c) =	$1,017,600	
TOTAL CONSTRUCTION				**$20,522,100**	
PLANNING & PERMITTING (15%*a)				**$2,422,900**	
ENGINEERING & DESIGN (15%*a)				**$2,422,900**	
R/W ACQUISITION, 5300 LF x 50', and Relocation Cost				**$13,500,000**	
TOTAL COST FOR ALTERNATIVE				**$38,867,900**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

Signalized T intersection cost is estimated

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHCRELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: PUNALUU REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	2,100	LF								
EXCAVATION/BACKFILL	5.2	CY/LF			10,920	CY	$25.00	$273,000	20%	$327,600
ARMOR	3.7	CY/LF	1.6	TN/CY	12,432	TNS	$70.00	$870,240	20%	$1,044,300
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	12,495	TNS	$60.00	$749,700	20%	$899,600
FILTER FABRIC	40	SF/LF			84,000	SF	$0.45	$37,800	20%	$45,400
REVETMENT TOTAL										$2,316,900
METAL GUARDRAIL					2,100	LF	$60.00	$126,000	20%	$151,200
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$231,700
TRAFFIC CONTROL					FA	FA				$115,800
ENVIRONMENTAL CONTROLS					FA	FA				$463,400
TOTAL FOR ALTERNATIVE PLAN									a	$3,279,000
CONTINGENCIES					5% *a				b	$164,000
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$516,500
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$206,600
TOTAL CONSTRUCTION										**$4,166,100**
PLANNING & PERMITTING (15%*a)										**$491,900**
ENGINEERING & DESIGN (15%*a)										**$491,900**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$5,149,900**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

OAHU: Kamehameha Highway at Punaluu

New 50 ft. R/W roadway 4,400 LF, two T intersections with Kamehameha Hwy., new Punaluu Stream crossing

CONSTRUCTION	Qty.	Units	Unit Cost	Total Cost	
New roadway	4,400	LF	$900	$3,960,000	
New Punaluu Bridge	126	LF	$26,000	$3,276,000	
New North Punaluu Bridge	50	LF	$26,000	$1,300,000	
T intersections	3	EA	$80,000	$240,000	
Mobilization	FA	FA		$877,600	
Traffic Control	FA	FA		$438,800	
Environmental Controls	FA	FA		$219,400	
Estimated Construction Cost Total =				$10,311,800	a
Contingencies (5%*a) =				$515,600	b
Construction Engineering (15%*(a+b)) =				$1,624,100	c
Administration Non-participating (40%*c) =				$649,600	
TOTAL CONSTRUCTION				**$13,101,100**	
PLANNING & PERMITTING (15%*a)				**$1,546,800**	
ENGINEERING & DESIGN (15%*a)				**$1,546,800**	
R/W ACQUISITION, 4400 LF x 50', and Relocation Cost				**$4,000,000**	
TOTAL COST FOR ALTERNATIVE				**$20,194,700**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

Signalized T intersection cost is estimated

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: PUNALUU BEACH FILL

CONSTRUCTION COST			QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0 LF							
EXCAVATION/BACKFILL	0 CY/LF		0	CY	$25.00	$0	20%	$0
ARMOR	0 CY/LF	1.6 TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0 CY/LF	1.7 TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0 SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL								$0
BEACH FILL								
BEACH SAND FILL			52,500	CY	$35.00	$1,837,500	20%	$2,205,000
GRASSING			52,500	SF	$2.00	$105,000	20%	$126,000
GROINS/BW	0 CY	1.6 TN/CY	0	TNS	$85.00	$0	20%	$0
EXTEND CULVERT			150	LF	$1,000.00	$150,000	20%	$180,000
BEACH FILL TOTAL								$2,511,000
SEAWALL	0 LF							
EXCAVATION/BACKFILL	0 CY/LF		0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/LF		0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL								$0
GENERAL REQUIREMENTS								
MOBILIZATION								$251,100
TRAFFIC CONTROL			FA	FA				$125,600
ENVIRONMENTAL CONTROLS			FA	FA				$502,200
TOTAL FOR ALTERNATIVE PLAN							a	$3,389,900
CONTINGENCIES			5% *a				b	$169,500
CONSTRUCTION ENGINEERING			15% *(a+b)				c	$533,900
ADMINISTRATION (NON-PARTICIPATING)			40% *c					$213,600
TOTAL CONSTRUCTION								**$4,306,900**
PLANNING & PERMITTING (15%*a)								**$508,500**
ENGINEERING & DESIGN (15%*a)								**$508,500**
R/W ACQUISITION								
TOTAL COST FOR ALTERNATIVE								**$5,323,900**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: KAAAWA REVETMENT STA. 851-867 & 887-915

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1,600	LF								
EXCAVATION/BACKFILL	2.6	CY/LF			4,160	CY	$25.00	$104,000	20%	$124,800
ARMOR	4.3	CY/LF	1.6	TN/CY	11,008	TNS	$70.00	$770,560	20%	$924,700
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	9,520	TNS	$60.00	$571,200	20%	$685,400
FILTER FABRIC	40	SF/LF			64,000	SF	$0.45	$28,800	20%	$34,600
REVETMENT TOTAL: STA. 851-867										$1,769,500
REVETMENT	2,800	LF								
EXCAVATION/BACKFILL	3	CY/LF			8,400	CY	$25.00	$210,000	20%	$252,000
ARMOR	3.7	CY/LF	1.6	TN/CY	16,576	TNS	$70.00	$1,160,320	20%	$1,392,400
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	16,660	TNS	$60.00	$999,600	20%	$1,199,500
FILTER FABRIC	40	SF/LF			112,000	SF	$0.45	$50,400	20%	$60,500
REVETMENT TOTAL: STA. 887-915										$2,904,400
METAL GUARDRAIL					4,400	LF	$60.00	$264,000	20%	$316,800
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$467,400
TRAFFIC CONTROL					FA	FA				$233,700
ENVIRONMENTAL CONTROLS					FA	FA				$934,800
TOTAL FOR ALTERNATIVE PLAN									a	$6,626,600
CONTINGENCIES					5% *a				b	$331,300
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$1,043,700
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$417,500
TOTAL CONSTRUCTION										**$8,419,100**
PLANNING & PERMITTING (15%*a)										**$994,000**
ENGINEERING & DESIGN (15%*a)										**$994,000**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$10,407,100**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: KAAAWA-KAOLO PT. REVETMENT STA. 784-840

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	2,100	LF								
EXCAVATION/BACKFILL	10	CY/LF			21,000	CY	$25.00	$525,000	20%	$630,000
ARMOR	3.7	CY/LF	1.6	TN/CY	12,432	TNS	$70.00	$870,240	20%	$1,044,300
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	12,495	TNS	$60.00	$749,700	20%	$899,600
FILTER FABRIC	40	SF/LF			84,000	SF	$0.45	$37,800	20%	$45,400
REVETMENT TOTAL: STA. 790-806 & 816-821										$2,619,300
REVETMENT	1,600	LF								
EXCAVATION/BACKFILL	4.6	CY/LF			7,360	CY	$25.00	$184,000	20%	$220,800
ARMOR	3.7	CY/LF	1.6	TN/CY	9,472	TNS	$70.00	$663,040	20%	$795,600
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	9,520	TNS	$60.00	$571,200	20%	$685,400
FILTER FABRIC	40	SF/LF			64,000	SF	$0.45	$28,800	20%	$34,600
REVETMENT TOTAL: STA. 784-790 & 806-816										$1,736,400
REVETMENT	1,100	LF								
EXCAVATION/BACKFILL	3.6	CY/LF			3,960	CY	$25.00	$99,000	20%	$118,800
ARMOR	4.3	CY/LF	1.6	TN/CY	7,568	TNS	$70.00	$529,760	20%	$635,700
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	6,545	TNS	$60.00	$392,700	20%	$471,200
FILTER FABRIC	40	SF/LF			44,000	SF	$0.45	$19,800	20%	$23,800
REVETMENT TOTAL: STA. 829-840										$1,249,500
METAL GUARDRAIL					4,800	LF	$60.00	$288,000	20%	$345,600
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$560,500
TRAFFIC CONTROL					FA	FA				$280,300
ENVIRONMENTAL CONTROLS					FA	FA				$1,121,000
TOTAL FOR ALTERNATIVE PLAN									a	$7,912,600
CONTINGENCIES					5% *a				b	$395,600
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$1,246,200
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$498,500
TOTAL CONSTRUCTION										**$10,052,900**
PLANNING & PERMITTING (15%*a)										**$1,186,900**
ENGINEERING & DESIGN (15%*a)										**$1,186,900**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$12,426,700**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: KAAAWA-KAOLO PT. REVETMENT+BEACH STA. 784-840

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	2,100	LF								
EXCAVATION/BACKFILL	10	CY/LF			21,000	CY	$25.00	$525,000	20%	$630,000
ARMOR	3.7	CY/LF	1.6	TN/CY	12,432	TNS	$70.00	$870,240	20%	$1,044,300
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	12,495	TNS	$60.00	$749,700	20%	$899,600
FILTER FABRIC	40	SF/LF			84,000	SF	$0.45	$37,800	20%	$45,400
REVETMENT TOTAL: STA. 790-806 & 816-821										$2,619,300
REVETMENT	1,600	LF								
EXCAVATION/BACKFILL	4.6	CY/LF			7,360	CY	$25.00	$184,000	20%	$220,800
ARMOR	3.7	CY/LF	1.6	TN/CY	9,472	TNS	$70.00	$663,040	20%	$795,600
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	9,520	TNS	$60.00	$571,200	20%	$685,400
FILTER FABRIC	40	SF/LF			64,000	SF	$0.45	$28,800	20%	$34,600
REVETMENT TOTAL: STA. 784-790 & 806-816										$1,736,400
METAL GUARDRAIL					3,700	LF	$60.00	$222,000	20%	$266,400
BEACH FILL										
BEACH SAND FILL					34,800	CY	$35.00	$1,218,000	20%	$1,461,600
GRASSING					33,000	SF	$2.00	$60,000	20%	$72,000
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
EXTEND CULVERT					150	LF	$1,000.00	$150,000	20%	$180,000
BEACH FILL TOTAL										$1,713,600
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$606,900
TRAFFIC CONTROL					FA	FA				$303,500
ENVIRONMENTAL CONTROLS					FA	FA				$1,213,900
TOTAL FOR ALTERNATIVE PLAN									a	$8,460,000
CONTINGENCIES					5% *a				b	$423,000
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$1,332,500
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$533,000
TOTAL CONSTRUCTION										**$10,748,500**
PLANNING & PERMITTING (15%*a)										**$1,269,000**
ENGINEERING & DESIGN (15%*a)										**$1,269,000**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$13,286,500**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

OAHU: Kamehameha Highway at Kaaawa and Kaaawa-Kaolo Pt.

New 50 ft. R/W roadway 11,000 LF, T intersections with Kina, Keo, Lau, Kaaawa Park Lane, Kekio, Kamehameha Hwy (2), 4-way intersections at Olohu, Polinalina, Kaaawa Place, new bridges at Kaaawa Stream and Makaua Stream.

CONSTRUCTION	Qty.	Units	Unit Cost	Total Cost	
New roadway	11,000	LF	$900	$9,900,000	
New Kaaawa Bridge	126	LF	$26,000	$3,276,000	
New Makaua Bridge	44	LF	$26,000	$1,144,000	
Culvert crossings	6	EA	$75,000	$450,000	
Kina, Keo Lau, Kaaawa Park Lane, Kekio minor street T intersections	6	EA	$30,000	$180,000	
Olohu, Polinalina, Kaaawa Pl., minor street 4-way intersections	3	EA	$40,000	$120,000	
Kam Hwy. T intersections	2	EA	$80,000	$160,000	
Mobilization	FA	FA		$1,523,000	
Traffic Control	FA	FA		$761,500	
Environmental Controls	FA	FA		$380,800	
Estimated Construction Cost Total =				$17,895,300	a
Contingencies (5%*a) =				$894,800	b
Construction Engineering (15%*(a+b)) =				$2,818,500	c
Administration Non-participating (40%*c) =				$1,127,400	
TOTAL CONSTRUCTION				**$22,736,000**	
PLANNING & PERMITTING (15%*a)				**$2,684,300**	
ENGINEERING & DESIGN (15%*a)				**$2,684,300**	
R/W ACQUISITION,11000 LF x 50', and Relocation Cost				**$22,000,000**	
TOTAL COST FOR ALTERNATIVE				**$50,104,600**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

Signalized T intersection cost is estimated

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: KUALOA REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	QUANTITY UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1,400	LF								
EXCAVATION/BACKFILL	2.6	CY/LF			3,640	CY	$25.00	$91,000	20%	$109,200
ARMOR	3.6	CY/LF	1.6	TN/CY	8,064	TNS	$70.00	$564,480	20%	$677,400
UNDERLAYER	2.6	CY/LF	1.7	TN/CY	6,188	TNS	$60.00	$371,280	20%	$445,500
FILTER FABRIC	35	SF/LF			49,000	SF	$0.45	$22,050	20%	$26,500
REVETMENT TOTAL										$1,258,600
METAL GUARDRAIL					1,400	LF	$60.00	$84,000	20%	$100,800
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$35.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$125,900
TRAFFIC CONTROL					FA	FA				$62,900
ENVIRONMENTAL CONTROLS					FA	FA				$251,700
TOTAL FOR ALTERNATIVE PLAN									a	$1,799,900
CONTINGENCIES					5% *a				b	$90,000
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$283,500
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$113,400
TOTAL CONSTRUCTION										**$2,286,800**
PLANNING & PERMITTING (15%*a)										**$270,000**
ENGINEERING & DESIGN (15%*a)										**$270,000**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$2,826,800**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

OAHU: Kamehameha Highway at Kualoa

New 50 ft. R/W roadway 4,100 LF, (incl. 800 LF divided roadway), two T intersections with Kamehameha Highway

CONSTRUCTION	Qty.	Units	Unit Cost	Total Cost	
New roadway, incl. 800 LF divided	4,100	LF	$900	$3,690,000	
T intersections with Kam Hwy.	2	EA	$80,000	$160,000	
Mobilization	FA	FA		$385,000	
Traffic Control	FA	FA		$192,500	
Environmental Controls	FA	FA		$96,300	
			Estimated Construction Cost Total =	$4,523,800	a
			Contingencies (5%*a) =	$226,200	b
			Construction Engineering (15%*(a+b)) =	$712,500	c
			Administration Non-participating (40%*c) =	$285,000	
TOTAL CONSTRUCTION				**$5,747,500**	
PLANNING & PERMITTING (15%*a)				**$678,600**	
ENGINEERING & DESIGN (15%*a)				**$678,600**	
R/W ACQUISITION, 4100 LF x 50'				**$700,000**	
TOTAL COST FOR ALTERNATIVE				**$7,804,700**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Signalized T intersection cost is estimated

Note that the cost for Administration has beer changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: MAKAPUU HARDENING

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1400	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
ARMOR	1.4	CY/LF	1.6	TN/CY	3,136	TNS	$70.00	$219,520	20%	$263,400
UNDERLAYER	0	CY/LF	1.7	TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	20	SF/LF			28,000	SF	$0.45	$12,600	20%	$15,100
REVETMENT TOTAL:MP 7.18-7.38 & 7.61-7.67										$278,500
SEAWALL	1400	LF								
EXCAVATION/BACKFILL	0.3	CY/LF			420	CY	$25.00	$10,500	20%	$12,600
CIP WALL	0.15	CY/LF			210	CY	$600.00	$126,000	20%	$151,200
CIP WALL (FOOTING)	0.1	CY/LF			140	CY	$750.00	$105,000	20%	$126,000
GRAVEL BACKFILL	0.2	CY/LF			280	CY	$75.00	$21,000	20%	$25,200
TOTAL SEAWALL: MP 7.18-7.38 & 7.61-7.67										$315,000
REVETMENT	1250	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
ARMOR	1.2	CY/LF	1.6	TN/CY	2,400	TNS	$70.00	$168,000	20%	$201,600
UNDERLAYER	1.3	CY/LF	1.7	TN/CY	2,763	TNS	$60.00	$165,750	20%	$198,900
FILTER FABRIC	45	SF/LF			56,250	SF	$0.45	$25,313	20%	$30,400
REVETMENT TOTAL:MP 7.38-7.61										$430,900
SEAWALL	1250	LF								
EXCAVATION/BACKFILL	0.3	CY/LF			375	CY	$25.00	$9,375	20%	$11,300
CIP WALL	0.22	CY/LF			275	CY	$600.00	$165,000	20%	$198,000
CIP WALL (FOOTING)	0.15	CY/LF			188	CY	$750.00	$140,625	20%	$168,800
GRAVEL BACKFILL	2.14	CY/LF			2,675	CY	$75.00	$200,625	20%	$240,800
TOTAL SEAWALL: MP 7.38-7.61										$618,900
METAL GUARDRAIL					2,650	LF	$60.00	$159,000	20%	$190,800
GENERAL REQUIREMENTS										
MOBILIZATION										$164,300
TRAFFIC CONTROL					FA	FA				$82,200
ENVIRONMENTAL CONTROLS					FA	FA				$328,700
TOTAL FOR ALTERNATIVE PLAN									a	$2,409,300
CONTINGENCIES					5% *a				b	$120,500
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$379,500
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$151,800
TOTAL CONSTRUCTION										**$3,061,100**
PLANNING & PERMITTING (15%*a)										**$361,400**
ENGINEERING & DESIGN (15%*a)										**$361,400**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$3,783,900**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

OAHU: Kalanianaole Highway at Makapuu

Realigned roadway 1,500 LF (1 lane only)

Description	Qty.	Units	Unit Cost	Total Cost	
New roadway	1,500	LF	$450	$675,000	
Mobilization	FA	FA		$67,500	
Traffic Control	FA	FA		$33,800	
Environmental Controls	FA	FA		$16,900	
Estimated Construction Cost Total =				$793,200	a
Contingencies (5%) =				$39,700	b
Construction Engineering (15%) =				$124,900	c
Administration Non-participating (40%) =				$50,000	
TOTAL CONSTRUCTION				**$1,007,800**	
PLANNING & PERMITTING (15%*a)				**$119,000**	
ENGINEERING & DESIGN (15%*a)				**$119,000**	
R/W ACQUISITION				**$0**	
TOTAL COST FOR ALTERNATIVE				**$1,245,800**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

OAHU: Farrington Highway at Makaha

New 80' R/W roadway 2,000 LF; 4-way intersection at Kili Drive; new bridge

Description	Qty.	Units	Unit Cost	Total Cost	
New roadway	2,000	LF	$900	$1,800,000	
New bridge	80	LF	$26,000	$2,080,000	
4-way intersection with Kili Drive	1	EA	$40,000	$40,000	
Mobilization	FA	FA		$392,000	
Traffic Control	FA	FA		$196,000	
Environmental Controls	FA	FA		$98,000	
			Estimated Construction Cost Total =	$4,606,000	a
			Contingencies (5%) =	$230,300	b
			Construction Engineering (15%) =	$725,400	c
			Administration Non-participating (40%) =	$290,200	
TOTAL CONSTRUCTION				**$5,851,900**	
PLANNING & PERMITTING (15%*a)				**$690,900**	
ENGINEERING & DESIGN (15%*a)				**$690,900**	
R/W ACQUISITION, 2000 LF x 80'				**$2,000,000**	
TOTAL COST FOR ALTERNATIVE				**$9,233,700**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

Signalized intersection cost is estimated.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: MAKAHA BEACH FILL WITH GRASSED DUNE

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0 LF								
EXCAVATION/BACKFILL	0 CY/LF			0	CY	$25.00	$0	20%	$0
ARMOR	0 CY/LF	1.6	TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0 CY/LF	1.7	TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0 SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL									$0
BEACH FILL									
BEACH SAND FILL				27,000	CY	$35.00	$945,000	20%	$1,134,000
GROINS/BW	0 CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
GRASSING	40 SF/LF			24,000	SF	$2.00	$48,000	20%	$57,600
BEACH FILL TOTAL									$1,191,600
SEAWALL	0 LF								
EXCAVATION/BACKFILL	0 CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$119,200
TRAFFIC CONTROL				FA	FA				$59,600
ENVIRONMENTAL CONTROLS				FA	FA				$238,300
TOTAL FOR ALTERNATIVE PLAN								a	$1,608,700
CONTINGENCIES				5% *a				b	$80,400
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$253,400
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$101,400
TOTAL CONSTRUCTION									**$2,043,900**
PLANNING & PERMITTING (15%*a)									**$241,300**
ENGINEERING & DESIGN (15%*a)									**$241,300**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$2,526,500**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

OAHU: MAKAHA REVETTED DUNE

CONSTRUCTION COST					QUANTITY NUMBER	QUANTITY UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	600	LF								
EXCAVATION/BACKFILL	2.7	CY/LF			1,620	CY	$25.00	$40,500	20%	$48,600
ARMOR	2.4	CY/LF	1.6	TN/CY	2,304	TNS	$70.00	$161,280	20%	$193,500
UNDERLAYER	2.3	CY/LF	1.7	TN/CY	2,346	TNS	$60.00	$140,760	20%	$168,900
FILTER FABRIC	35	SF/LF			21,000	SF	$0.45	$9,450	20%	$11,300
REVETMENT TOTAL										$422,300
BEACH FILL										
BEACH SAND FILL					3,333	CY	$35.00	$116,655	20%	$140,000
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
GRASSING	30	SF/LF			18,000	SF	$2.00	$36,000	20%	$43,200
BEACH FILL TOTAL										$183,200
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$60,600
TRAFFIC CONTROL					FA	FA				$30,300
ENVIRONMENTAL CONTROLS					FA	FA				$121,100
TOTAL FOR ALTERNATIVE PLAN									a	$817,500
CONTINGENCIES					5% *a				b	$40,900
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$128,800
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$51,500
TOTAL CONSTRUCTION										**$1,038,700**
PLANNING & PERMITTING (15%*a)										**$122,600**
ENGINEERING & DESIGN (15%*a)										**$122,600**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$1,283,900**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

KAUAI: HANALEI REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1600	LF								
EXCAVATION/BACKFILL	5.2	CY/LF			8,320	CY	$25.00	$208,000	20%	$249,600
ARMOR	2.5	CY/LF	1.6	TN/CY	6,400	TNS	$70.00	$448,000	20%	$537,600
UNDERLAYER	2.1	CY/LF	1.7	TN/CY	5,712	TNS	$60.00	$342,720	20%	$411,300
FILTER FABRIC	28	SF/LF			44,800	SF	$0.45	$20,160	20%	$24,200
REVETMENT TOTAL										$1,222,700
METAL GUARDRAIL					1,600	LF	$60.00	$96,000	20%	$115,200
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$122,300
TRAFFIC CONTROL					FA	FA				$61,100
ENVIRONMENTAL CONTROLS					FA	FA				$244,500
TOTAL FOR ALTERNATIVE PLAN									a	$1,765,800
CONTINGENCIES					5%	*a			b	$88,300
CONSTRUCTION ENGINEERING					15%	*(a+b)			c	$278,100
ADMINISTRATION (NON-PARTICIPATING)					40%	*c				$111,200
TOTAL CONSTRUCTION										**$2,243,400**
PLANNING & PERMITTING (15%*a)										**$264,900**
ENGINEERING & DESIGN (15%*a)										**$264,900**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$2,773,200**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

KAUAI: Kuhio Highway at Hanalei

New 40 ft. R/W roadway, 1,800 LF, Waikoko Stream crossing, abandon old roadbed

Description	Qty.	Units	Unit Cost	Total Cost	
New roadway	1,600	LF	$900	$1,440,000	
New Waikoko Stream crossing	200	LF	$26,000	$5,200,000	
Remove Pavement	1,700	LF	$15	$25,500	
Mobilization	FA	FA		$664,000	
Traffic Control	FA	FA		$332,000	
Environmental Controls	FA	FA		$166,000	
			Estimated Construction Cost Total =	$7,827,500	a
			Contingencies (5%*a) =	$391,400	b
			Construction Engineering (15%*(a+b)) =	$1,232,800	c
			Administration Non-participating (40%*c) =	$493,100	
TOTAL CONSTRUCTION				**$9,944,800**	
PLANNING & PERMITTING (15%*a)				**$1,174,100**	
ENGINEERING & DESIGN (15%*a)				**$1,174,100**	
R/W ACQUISITION, 1800 LF x 40'				**$500,000**	
TOTAL COST FOR ALTERNATIVE				**$12,793,000**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

Note that the cost for Administration has been changed to "paricipating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MOLOKAI: NIAUPALA REVETMENT

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1,400	LF							
EXCAVATION/BACKFILL	0.9	CY/LF		1,260	CY	$25.00	$31,500	20%	$37,800
ARMOR	1.7	CY/LF	1.6 TN/CY	3,808	TNS	$70.00	$266,560	20%	$319,900
UNDERLAYER	1.5	CY/LF	1.7 TN/CY	3,570	TNS	$60.00	$214,200	20%	$257,000
FILTER FABRIC	0	SF/LF		0	SF	$0.45	$0	20%	$0
GRAVEL BACKFILL	1.5	CY/LF		2,100	CY	$75.00	$157,500	20%	$189,000
REVETMENT TOTAL									$803,700
BEACH FILL									
BEACH SAND FILL				0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6 TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$0
SEAWALL	0	LF							
EXCAVATION/BACKFILL	0	CY/LF		0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF		0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$80,400
TRAFFIC CONTROL				FA	FA				$40,200
ENVIRONMENTAL CONTROLS				FA	FA				$160,700
TOTAL FOR ALTERNATIVE PLAN								a	$1,085,000
CONTINGENCIES				5% *a				b	$54,300
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$170,900
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$68,400
TOTAL CONSTRUCTION									**$1,378,600**
PLANNING & PERMITTING (15%*a)									**$162,800**
ENGINEERING & DESIGN (15%*a)									**$162,800**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$1,704,200**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MOLOKAI: NIAUPALA BEACH FILL

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0	LF							
EXCAVATION/BACKFILL	0	CY/LF		0	CY	$25.00	$0	20%	$0
ARMOR	0	CY/LF	1.6 TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0	CY/LF	1.7 TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0	SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL									$0
BEACH FILL									
BEACH SAND FILL				35,833	CY	$35.00	$1,254,155	20%	$1,505,000
GROINS/BW	0	CY	1.6 TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$1,505,000
SEAWALL	0	LF							
EXCAVATION/BACKFILL	0	CY/LF		0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF		0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$150,500
TRAFFIC CONTROL				FA	FA				$75,300
ENVIRONMENTAL CONTROLS				FA	FA				$301,000
TOTAL FOR ALTERNATIVE PLAN								a	$2,031,800
CONTINGENCIES				5% *a				b	$101,600
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$320,000
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$128,000
TOTAL CONSTRUCTION									**$2,581,400**
PLANNING & PERMITTING (15%*a)									**$304,800**
ENGINEERING & DESIGN (15%*a)									**$304,800**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$3,191,000**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MOLOKAI: WAIALUA-KUMIMI REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	3,300	LF								
EXCAVATION/BACKFILL	2	CY/LF			6,600	CY	$25.00	$165,000	20%	$198,000
ARMOR	5.2	CY/LF	1.6	TN/CY	27,456	TNS	$70.00	$1,921,920	20%	$2,306,300
UNDERLAYER	2.2	CY/LF	1.7	TN/CY	12,342	TNS	$60.00	$740,520	20%	$888,600
FILTER FABRIC	33	SF/LF			108,900	SF	$0.45	$49,005	20%	$58,800
REVETMENT TOTAL: WAIALUA-PALALUPI										$3,451,700
REVETMENT	900	LF								
EXCAVATION/BACKFILL	2.2	CY/LF			1,980	CY	$25.00	$49,500	20%	$59,400
ARMOR	10.3	CY/LF	1.6	TN/CY	14,832	TNS	$70.00	$1,038,240	20%	$1,245,900
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	5,355	TNS	$60.00	$321,300	20%	$385,600
FILTER FABRIC	0	SF/LF			0	SF	$0.45	$0	20%	$0
GRAVEL BACKFILL	4.2	CY/LF			3,780	CY	$75.00	$283,500	20%	$340,200
REVETMENT TOTAL: KUMIMI										$2,031,100
METAL GUARDRAIL					4,200	LF	$60.00	$252,000	20%	$302,400
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL										$0
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$548,300
TRAFFIC CONTROL					FA	FA				$274,100
ENVIRONMENTAL CONTROLS					FA	FA				$1,096,600
TOTAL FOR ALTERNATIVE PLAN										$7,704,200
CONTINGENCIES					5% *a				b	$385,200
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$1,213,400
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$485,400
TOTAL CONSTRUCTION										**$9,788,200**
PLANNING & PERMITTING (15%*a)										**$1,155,600**
ENGINEERING & DESIGN (15%*a)										**$1,155,600**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$12,099,400**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION + REVETMENT

MOLOKAI: Kam V Highway at Walalua to Kumimi

New 80' R/W roadway 5,000 LF

Description	Qty.	Units	Unit Cost	Total Cost	
New roadway	5,000	LF	$900	$4,500,000	
New Bridge	103	LF	$26,000	$2,678,000	
Remove Pavement	5,000	LF	$15	$75,000	
Mobilization	FA	FA		$717,800	
Traffic Control	FA	FA		$358,900	
Environmental Controls	FA	FA		$179,500	
			Estimated Construction Cost Total =	$8,509,200	a
			Contingencies (5%*a) =	$425,500	b
			Construction Engineering (15%*(a+b)) =	$1,340,200	c
			Administration Non-participating (40%*c) =	$536,100	
			TOTAL COST FOR HIGHWAY REALIGNMENT =	**$10,811,000**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

KUMIMI REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	900	LF								
EXCAVATION/BACKFILL	2.2	CY/LF			1,980	CY	$25.00	$49,500	20%	$59,400
ARMOR	10.3	CY/LF	1.6	TN/CY	14,832	TNS	$70.00	$1,038,240	20%	$1,245,900
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	5,355	TNS	$60.00	$321,300	20%	$385,600
FILTER FABRIC	0	SF/LF			0	SF	$0.45	$0	20%	$0
GRAVEL BACKFILL	4.2	CY/LF			3,780	CY	$75.00	$283,500	20%	$340,200
REVETMENT TOTAL										**$2,031,100**
METAL GUARDRAIL					900	LF	$60.00	$54,000	20%	$64,800
GENERAL REQUIREMENTS										
MOBILIZATION										$203,100
TRAFFIC CONTROL					FA	FA				$101,600
ENVIRONMENTAL CONTROLS					FA	FA				$406,200
TOTAL CONSTRUCTION COST FOR REVETMENT									a	$2,806,800
CONTINGENCIES					5% *a				b	$140,300
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$442,100
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$176,800
TOTAL COST FOR REVETMENT										**$3,566,000**
TOTAL CONSTRUCTION										**$14,377,000**
PLANNING & PERMITTING (15%*a)										**$1,697,400**
ENGINEERING & DESIGN (15%*a)										**$1,697,400**
R/W ACQUISITION, 5000 LF x 80', and Relocation Cost										**$2,500,000**
TOTAL COST FOR ALTERNATIVE										**$20,271,800**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be upcated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MOLOKAI: WAIALUA-KUMIMI REVETMENT + BEACH

CONSTRUCTION COST					QUANTITY NUMBER	QUANTITY UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1,500	LF								
EXCAVATION/BACKFILL	2	CY/LF			3,000	CY	$25.00	$75,000	20%	$90,000
ARMOR	5.2	CY/LF	1.6	TN/CY	12,480	TNS	$70.00	$873,600	20%	$1,048,300
UNDERLAYER	2.2	CY/LF	1.7	TN/CY	5,610	TNS	$60.00	$336,600	20%	$403,900
FILTER FABRIC	33	SF/LF			49,500	SF	$0.45	$22,275	20%	$26,700
REVETMENT TOTAL: WAIALUA										$1,568,900
REVETMENT	900	LF								
EXCAVATION/BACKFILL	2.2	CY/LF			1,980	CY	$25.00	$49,500	20%	$59,400
ARMOR	10.3	CY/LF	1.6	TN/CY	14,832	TNS	$70.00	$1,038,240	20%	$1,245,900
UNDERLAYER	3.5	CY/LF	1.7	TN/CY	5,355	TNS	$60.00	$321,300	20%	$385,600
FILTER FABRIC	0	SF/LF			0	SF	$0.45	$0	20%	$0
GRAVEL BACKFILL	4.2	CY/LF			3,780	CY	$75.00	$283,500	20%	$340,200
REVETMENT TOTAL: KUMIMI										$2,031,100
METAL GUARDRAIL					4,200	LF	$60.00	$252,000	20%	$302,400
BEACH FILL										
BEACH SAND FILL					44,670	CY	$35.00	$1,563,450	20%	$1,876,100
GROINS/BW	5,350	CY	1.6	TN/CY	3,560	TNS	$85.00	$727,600	20%	$873,100
BEACH FILL TOTAL										$2,749,200
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$634,900
TRAFFIC CONTROL					FA	FA				$317,500
ENVIRONMENTAL CONTROLS					FA	FA				$1,269,800
TOTAL FOR ALTERNATIVE PLAN									a	$8,873,800
CONTINGENCIES					5% *a				b	$443,700
CONSTRUCTION ENGINEERING					15% *(a+b)				c	$1,397,600
ADMINISTRATION (NON-PARTICIPATING)					40% *c					$559,000
TOTAL CONSTRUCTION										**$11,274,100**
PLANNING & PERMITTING (15%*a)										**$1,331,100**
ENGINEERING & DESIGN (15%*a)										**$1,331,100**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$13,936,300**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: KAHULUI BAY CRM WALL

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0	LF							
EXCAVATION/BACKFILL	0	CY/LF		0	CY	$25.00	$0	20%	$0
ARMOR	0	CY/LF	1.6 TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0	CY/LF	1.7 TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0	SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL									$0
BEACH FILL									
BEACH SAND FILL				0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6 TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$0
SEAWALL	800	LF							
EXCAVATION/BACKFILL	0.7	CY/LF		560	CY	$25.00	$14,000	20%	$16,800
CRM WALL	26.2	CF/LF		20,960	CF	$19.50	$408,720	20%	$490,500
CIP FOOTING	0	CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL: OUTSIDE HARBOR									$507,300
SEAWALL	2,600	LF							
EXCAVATION/BACKFILL	0.7	CY/LF		1,820	CY	$25.00	$45,500	20%	$54,600
CRM WALL	33.5	CF/LF		87,100	CF	$19.50	$1,698,450	20%	$2,038,100
CIP FOOTING	0.41	CY/LF		1,066	CY	$750.00	$799,500	20%	$959,400
GRAVEL BACKFILL	0.32	CY/LF		832	CY	$75.00	$62,400	20%	$74,900
TOTAL SEAWALL: INSIDE HARBOR									$3,127,000
METAL GUARDRAIL				3,400	LF	$60.00	$204,000	20%	$244,800
GENERAL REQUIREMENTS									
MOBILIZATION									$363,400
TRAFFIC CONTROL				FA	FA				$181,700
ENVIRONMENTAL CONTROLS				FA	FA				$726,900
TOTAL FOR ALTERNATIVE PLAN								a	$5,151,100
CONTINGENCIES				5% *a				b	$257,600
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$811,300
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$324,500
TOTAL CONSTRUCTION									**$6,544,500**
PLANNING & PERMITTING (15%*a)									**$772,700**
ENGINEERING & DESIGN (15%*a)									**$772,700**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$8,089,900**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: KAHULUI BAY CRM WALL + COMPOSITE SLOPE PROTECTION

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	2,600	LF							
EXCAVATION/BACKFILL	0	CY/LF		0	CY	$25.00	$0	20%	$0
ARMOR	0.82	CY/LF	1.6 TN/CY	3,411	TNS	$70.00	$238,784	20%	$286,500
UNDERLAYER	0	CY/LF	1.7 TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0	SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL									$286,500
BEACH FILL									
BEACH SAND FILL				0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6 TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$0
SEAWALL	800	LF							
EXCAVATION/BACKFILL	0.7	CY/LF		560	CY	$25.00	$14,000	20%	$16,800
CRM WALL	26.2	CF/LF		20,960	CF	$19.50	$408,720	20%	$490,500
CIP FOOTING	0	CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL: OUTSIDE HARBOR									$507,300
SEAWALL	2,600	LF							
EXCAVATION/BACKFILL	0.9	CY/LF		2,340	CY	$25.00	$58,500	20%	$70,200
CRM WALL	0	CF/LF		0	CF	$19.50	$0	20%	$0
CIP WALL	0.47	CY/LF		1,222	CY	$750.00	$916,500	20%	$1,099,800
GRAVEL BACKFILL	0.8	CY/LF		2,080	CY	$75.00	$156,000	20%	$187,200
TOTAL SEAWALL: INSIDE HARBOR									$1,357,200
METAL GUARDRAIL				3,400	LF	$60.00	$204,000	20%	$244,800
GENERAL REQUIREMENTS									
MOBILIZATION									$215,100
TRAFFIC CONTROL				FA	FA				$107,600
ENVIRONMENTAL CONTROLS				FA	FA				$430,200
TOTAL FOR ALTERNATIVE PLAN								a	$3,148,700
CONTINGENCIES				5% *a				b	$157,400
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$495,900
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$198,400
TOTAL CONSTRUCTION									**$4,000,400**
PLANNING & PERMITTING (15%*a)									**$472,300**
ENGINEERING & DESIGN (15%*a)									**$472,300**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$4,945,000**

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1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: KEALIA POND REVETMENT

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	2,400 LF								
EXCAVATION/BACKFILL	6.2 CY/LF			14,880	CY	$25.00	$372,000	20%	$446,400
ARMOR	6.1 CY/LF	1.6	TN/CY	23,424	TNS	$70.00	$1,639,680	20%	$1,967,600
UNDERLAYER	4 CY/LF	1.7	TN/CY	16,320	TNS	$60.00	$979,200	20%	$1,175,000
FILTER FABRIC	40 SF/LF			96,000	SF	$0.45	$43,200	20%	$51,800
REVETMENT TOTAL: NW END									$3,640,800
REVETMENT	1,500 LF								
EXCAVATION/BACKFILL	9.7 CY/LF			14,550	CY	$25.00	$363,750	20%	$436,500
ARMOR	5 CY/LF	1.6	TN/CY	12,000	TNS	$70.00	$840,000	20%	$1,008,000
UNDERLAYER	3.1 CY/LF	1.7	TN/CY	7,905	TNS	$60.00	$474,300	20%	$569,200
FILTER FABRIC	37 SF/LF			55,500	SF	$0.45	$24,975	20%	$30,000
REVETMENT TOTAL: SE END									$2,043,700
BEACH FILL									
BEACH SAND FILL				0	CY	$35.00	$0	20%	$0
GROINS/BW	0 CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$0
SEAWALL	0 LF								
EXCAVATION/BACKFILL	0 CY/_F			0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/_F			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/_F			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/_F			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$568,500
TRAFFIC CONTROL				FA	FA				$284,200
ENVIRONMENTAL CONTROLS				FA	FA				$1,136,900
TOTAL FOR ALTERNATIVE PLAN								a	$7,674,100
CONTINGENCIES				5% *a				b	$383,700
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$1,208,700
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$483,500
TOTAL CONSTRUCTION									**$9,750,000**
PLANNING & PERMITTING (15%*a)									**$1,151,100**
ENGINEERING & DESIGN (15%*a)									**$1,151,100**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$12,052,200**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: KEALIA POND BEACH FILL

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0 LF								
EXCAVATION/BACKFILL	0 CY/LF			0	CY	$25.00	$0	20%	$0
ARMOR	0 CY/LF	1.6	TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0 CY/LF	1.7	TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0 SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL									$0
BEACH FILL									
BEACH SAND FILL				67,900	CY	$35.00	$2,376,500	20%	$2,851,800
GRASSING				97,500	SF	$2.00	$195,000	20%	$234,000
GROINS/BW	0 CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$3,085,800
SEAWALL	0 LF								
EXCAVATION/BACKFILL	0 CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$308,600
TRAFFIC CONTROL				FA	FA				$154,300
ENVIRONMENTAL CONTROLS				FA	FA				$617,200
TOTAL FOR ALTERNATIVE PLAN								a	$4,165,900
CONTINGENCIES				5% *a				b	$208,300
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$656,100
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$262,400
TOTAL CONSTRUCTION									**$5,292,700**
PLANNING & PERMITTING (15%*a)									**$624,900**
ENGINEERING & DESIGN (15%*a)									**$624,900**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$6,542,500**

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1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

MAUI: North Kihei Road at Kealia

New 5,200 LF elevated roadway, 50 ft R/W adjacent existng 40 ft. R/W

Description	Qty.	Units	Unit Cost	Total Cost	
New elevated roadway structure	5,200	LF	$16,100	$83,720,000	
Remove Pavement	5,200	LF	$15	$78,000	
Mobilization	FA	FA		$4,186,000	
Traffic Control	FA	FA		$2,093,000	
Environmental Controls	FA	FA		$2,511,600	
			Estimated Construction Cost Total =	$92,588,600	a
			Contingencies (5%*a) =	$4,629,400	b
			Construction Engineering (15%*(a+b)) =	$14,582,700	c
			Administration Non-participating (40%*c) =	$5,833,100	
TOTAL CONSTRUCTION				**$117,633,800**	
PLANNING & PERMITTING (15%*a)				**$13,888,300**	
ENGINEERING & DESIGN (15%*a)				**$13,888,300**	
R/W ACQUISITION, 5200 LF x 50'				**$150,000**	
TOTAL COST FOR ALTERNATIVE				**$145,560,400**	

Assumptions
Elevated Roadway estimated to cost $350/SF.
LF cost based on 46 ft wide x $350/SF = $16,100/LF.

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1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: UKUMEHAME REVETMENT STA.51-56 & 74-82

CONSTRUCTION COST				QUANTITY NUMBER	QUANTITY UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	500 LF								
EXCAVATION/BACKFILL	3.3 CY/LF			1,650	CY	$25.00	$41,250	20%	$49,500
ARMOR	6.6 CY/LF	1.6	TN/CY	5,280	TNS	$70.00	$369,600	20%	$443,500
UNDERLAYER	3.5 CY/LF	1.7	TN/CY	2,975	TNS	$60.00	$178,500	20%	$214,200
FILTER FABRIC	0 SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL: STA.51-56									$707,200
REVETMENT	800 LF								
EXCAVATION/BACKFILL	5.2 CY/LF			4,160	CY	$25.00	$104,000	20%	$124,800
ARMOR	7.2 CY/LF	1.6	TN/CY	9,216	TNS	$70.00	$645,120	20%	$774,100
UNDERLAYER	3.3 CY/LF	1.7	TN/CY	4,488	TNS	$60.00	$269,280	20%	$323,100
FILTER FABRIC	0 SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL: STA.74-82									$1,222,000
METAL GUARDRAIL				1,300	LF	$60.00	$78,000	20%	$93,600
BEACH FILL									
BEACH SAND FILL				0	CY	$35.00	$0	20%	$0
GROINS/BW	0 CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$0
SEAWALL	0 LF								
EXCAVATION/BACKFILL	0 CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$192,900
TRAFFIC CONTROL				FA	FA				$96,500
ENVIRONMENTAL CONTROLS				FA	FA				$385,800
TOTAL FOR ALTERNATIVE PLAN								a	$2,698,000
CONTINGENCIES				5%	*a			b	$134,900
CONSTRUCTION ENGINEERING				15%	*(a+b)			c	$424,900
ADMINISTRATION (NON-PARTICIPATING)				40%	*c				$170,000
TOTAL CONSTRUCTION									**$3,427,800**
PLANNING & PERMITTING (15%*a)									**$404,700**
ENGINEERING & DESIGN (15%*a)									**$404,700**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$4,237,200**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: UKUMEHAME STA.90-98 & 137-143

CONSTRUCTION COST				QUANTITY NUMBER	QUANTITY UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	800 LF								
EXCAVATION/BACKFILL	1.7 CY/LF			1,360	CY	$25.00	$34,000	20%	$40,800
ARMOR	8.5 CY/LF	1.6	TN/CY	10,880	TNS	$70.00	$761,600	20%	$913,900
UNDERLAYER	3.3 CY/LF	1.7	TN/CY	4,488	TNS	$60.00	$269,280	20%	$323,100
FILTER FABRIC	0 SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL: STA.90-98									$1,277,800
REVETMENT	600 LF								
EXCAVATION/BACKFILL	4.2 CY/LF			2,520	CY	$25.00	$63,000	20%	$75,600
ARMOR	7.3 CY/LF	1.6	TN/CY	7,008	TNS	$70.00	$490,560	20%	$588,700
UNDERLAYER	3.3 CY/LF	1.7	TN/CY	3,366	TNS	$60.00	$201,960	20%	$242,400
FILTER FABRIC	0 SF/LF			0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL: STA.137-143									$906,700
METAL GUARDRAIL				1,400	LF	$60.00	$84,000	20%	$100,800
BEACH FILL									
BEACH SAND FILL				0	CY	$35.00	$0	20%	$0
GROINS/BW	0 CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$0
SEAWALL	0 LF								
EXCAVATION/BACKFILL	0 CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$218,500
TRAFFIC CONTROL				FA	FA				$109,200
ENVIRONMENTAL CONTROLS				FA	FA				$436,900
TOTAL FOR ALTERNATIVE PLAN								a	$3,049,900
CONTINGENCIES				5%	*a			b	$152,500
CONSTRUCTION ENGINEERING				15%	*(a+b)			c	$480,400
ADMINISTRATION (NON-PARTICIPATING)				40%	*c				$192,200
TOTAL CONSTRUCTION									**$3,875,000**
PLANNING & PERMITTING (15%*a)									**$457,500**
ENGINEERING & DESIGN (15%*a)									**$457,500**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$4,790,000**

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1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: UKUMEHAME STA.168-187

CONSTRUCTION COST			QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1,900 LF							
EXCAVATION/BACKFILL	0.6 CY/LF		1,140	CY	$25.00	$28,500	20%	$34,200
ARMOR	8.5 CY/LF	1.6 TN/CY	25,840	TNS	$70.00	$1,808,800	20%	$2,170,600
UNDERLAYER	3.3 CY/LF	1.7 TN/CY	10,659	TNS	$60.00	$639,540	20%	$767,400
FILTER FABRIC	0 SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL								$2,972,200
REVETMENT	0 LF							
EXCAVATION/BACKFILL	0 CY/LF		0	CY	$25.00	$0	20%	$0
ARMOR	0 CY/LF	1.6 TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0 CY/LF	1.7 TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0 SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL								$0
METAL GUARDRAIL			1,900	LF	$60.00	$114,000	20%	$136,800
BEACH FILL								
BEACH SAND FILL			0	CY	$35.00	$0	20%	$0
GROINS/BW	0 CY	1.6 TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL								$0
SEAWALL	0 LF							
EXCAVATION/BACKFILL	0 CY/LF		0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/LF		0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL								$0
GENERAL REQUIREMENTS								
MOBILIZATION								$297,200
TRAFFIC CONTROL			FA	FA				$148,600
ENVIRONMENTAL CONTROLS			FA	FA				$594,400
TOTAL FOR ALTERNATIVE PLAN							a	$4,149,200
CONTINGENCIES			5% *a				b	$207,500
CONSTRUCTION ENGINEERING			15% *(a+b)				c	$653,500
ADMINISTRATION (NON-PARTICIPATING)			40% *c					$261,400
TOTAL CONSTRUCTION								**$5,271,600**
PLANNING & PERMITTING (15%*a)								**$622,400**
ENGINEERING & DESIGN (15%*a)								**$622,400**
R/W ACQUISITION								
TOTAL COST FOR ALTERNATIVE								**$6,516,400**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: UKUMEHAME BEACH FILL

CONSTRUCTION COST			QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	0 LF							
EXCAVATION/BACKFILL	0 CY/LF		0	CY	$25.00	$0	20%	$0
ARMOR	0 CY/LF	1.6 TN/CY	0	TNS	$70.00	$0	20%	$0
UNDERLAYER	0 CY/LF	1.7 TN/CY	0	TNS	$60.00	$0	20%	$0
FILTER FABRIC	0 SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL								$0
METAL GUARDRAIL			1,900	LF	$60.00	$114,000	20%	$136,800
BEACH FILL								
BEACH SAND FILL			53,333	CY	$35.00	$1,866,655	20%	$2,240,000
GROINS/BW	6,580 CY	1.6 TN/CY	10,528	TNS	$85.00	$894,880	20%	$1,073,900
BEACH FILL TOTAL								$3,313,900
SEAWALL	0 LF							
EXCAVATION/BACKFILL	0 CY/LF		0	CY	$25.00	$0	20%	$0
CRM WALL	0 CF/LF		0	CF	$19.50	$0	20%	$0
CIP FOOTING	0 CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0 CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL								$0
GENERAL REQUIREMENTS								
MOBILIZATION								$331,400
TRAFFIC CONTROL			FA	FA				$165,700
ENVIRONMENTAL CONTROLS			FA	FA				$662,800
TOTAL FOR ALTERNATIVE PLAN							a	$4,610,600
CONTINGENCIES			5% *a				b	$230,500
CONSTRUCTION ENGINEERING			15% *(a+b)				c	$726,200
ADMINISTRATION (NON-PARTICIPATING)			40% *c					$290,500
TOTAL CONSTRUCTION								**$5,857,800**
PLANNING & PERMITTING (15%*a)								**$691,600**
ENGINEERING & DESIGN (15%*a)								**$691,600**
R/W ACQUISITION								
TOTAL COST FOR ALTERNATIVE								**$7,241,000**

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1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

MAUI: Honoapiilani Highway at Ukumehame

New 80 ft R/W 17,000 LF (incl. 2200 LF divided highway), new Ukumehame Bridge

CONSTRUCTION	Qty.	Units	Unit Cost	Total Cost	
New Ukumehame Bridge	35	LF	$26,000	$910,000	
New roadway	17,000	LF	$900	$15,300,000	
Mobilization	FA	FA		$1,621,000	
Traffic Control	FA	FA		$810,500	
Environmental Controls	FA	FA		$405,300	
			Estimated Construction Cost Total =	$19,046,800	a
			Contingencies (5%*a) =	$952,300	b
			Construction Engineering (15%*(a+b)) =	$2,999,900	c
			Administration Non-participating (40%*c)) =	$1,200,000	
TOTAL CONSTRUCTION				**$24,199,000**	
PLANNING & PERMITTING (15%*a)				**$2,857,000**	
ENGINEERING & DESIGN (15%*a)				**$2,857,000**	
R/W ACQUISITION, 17000 LF x 80'				**$10,000,000**	
TOTAL COST FOR ALTERNATIVE				**$39,913,000**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Bridges estimated to cost $500/sf. LF cost based on 2 lanes 12 ft wide, plus 2 shoulders 8 ft wide plus two sidewalks 4 ft wide, plus guardrails 2 ft wide = 52 SF/LF. Thus 1 LF of bridge is 52 SF, and 52 SF x $500/SF = $26,000/LF

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1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

MAUI: OLOWALU REVETMENT

CONSTRUCTION COST				QUANTITY NUMBER	UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	1,000	LF							
EXCAVATION/BACKFILL	5.8	CY/LF		5,800	CY	$25.00	$145,000	20%	$174,000
ARMOR	8	CY/LF	1.6 TN/CY	12,800	TNS	$70.00	$896,000	20%	$1,075,200
UNDERLAYER	4	CY/LF	1.7 TN/CY	6,800	TNS	$60.00	$408,000	20%	$489,600
FILTER FABRIC	0	SF/LF		0	SF	$0.45	$0	20%	$0
REVETMENT TOTAL									$1,738,800
METAL GUARDRAIL				1,000	LF	$60.00	$60,000	20%	$72,000
BEACH FILL									
BEACH SAND FILL				0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6 TN/CY	0	TNS	$85.00	$0	20%	$0
BEACH FILL TOTAL									$0
SEAWALL	0	LF							
EXCAVATION/BACKFILL	0	CY/LF		0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF		0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF		0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF		0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL									$0
GENERAL REQUIREMENTS									
MOBILIZATION									$173,900
TRAFFIC CONTROL				FA	FA				$86,900
ENVIRONMENTAL CONTROLS				FA	FA				$347,800
TOTAL FOR ALTERNATIVE PLAN								a	$2,419,400
CONTINGENCIES				5% *a				b	$121,000
CONSTRUCTION ENGINEERING				15% *(a+b)				c	$381,100
ADMINISTRATION (NON-PARTICIPATING)				40% *c					$152,400
TOTAL CONSTRUCTION									**$3,073,900**
PLANNING & PERMITTING (15%*a)									**$362,900**
ENGINEERING & DESIGN (15%*a)									**$362,900**
R/W ACQUISITION									
TOTAL COST FOR ALTERNATIVE									**$3,799,700**

Note that the cost for Administration has been changed to "participating" and the formula is revised on a periodic basis. The cost estimates are intended to be used for planning purposes only and should be updated at the time of implementation.

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HARDENING AND BEACH FILL

HAWAII: HILO REVETMENT

CONSTRUCTION COST					QUANTITY NUMBER	QUANTITY UNIT	UNIT COST	AMOUNT	CONT. %	TOTAL COST
REVETMENT	2,500	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
ARMOR	3.1	CY/LF	1.6	TN/CY	12,400	TNS	$70.00	$868,000	20%	$1,041,600
UNDERLAYER	2.4	CY/LF	1.7	TN/CY	10,200	TNS	$60.00	$612,000	20%	$734,400
FILTER FABRIC	32	SF/LF			80,000	SF	$0.45	$36,000	20%	$43,200
GRAVEL FILL	1	CY/LF			2,500	CF	$75.00	$187,500	20%	$225,000
REVETMENT TOTAL										$2,044,200
BEACH FILL										
BEACH SAND FILL					0	CY	$35.00	$0	20%	$0
GROINS/BW	0	CY	1.6	TN/CY	0	TNS	$85.00	$0	20%	$0
GROINS TOTAL										$0
SEAWALL	0	LF								
EXCAVATION/BACKFILL	0	CY/LF			0	CY	$25.00	$0	20%	$0
CRM WALL	0	CF/LF			0	CF	$19.50	$0	20%	$0
CIP FOOTING	0	CY/LF			0	CY	$750.00	$0	20%	$0
GRAVEL BACKFILL	0	CY/LF			0	CY	$75.00	$0	20%	$0
TOTAL SEAWALL										$0
GENERAL REQUIREMENTS										
MOBILIZATION										$204,400
TRAFFIC CONTROL					FA	FA				$102,200
ENVIRONMENTAL CONTROLS					FA	FA				$408,800
TOTAL FOR ALTERNATIVE PLAN									a	$2,759,600
CONTINGENCIES					5%	*a			b	$138,000
CONSTRUCTION ENGINEERING					15%	*(a+b)			c	$434,600
ADMINISTRATION (NON-PARTICIPATING)					40%	*c				$173,800
TOTAL CONSTRUCTION										**$3,506,000**
PLANNING & PERMITTING (15%*a)										**$413,900**
ENGINEERING & DESIGN (15%*a)										**$413,900**
R/W ACQUISITION										
TOTAL COST FOR ALTERNATIVE										**$4,333,800**

1984-03F STATEWIDE HIGHWAY SHORELINE PROTECTION
ALTERNATIVES ASSESSMENT - HIGHWAY REALIGNMENT/RELOCATION

HAWAII: Hilo Bayfront Highway through downtown Hilo to Kamehameha Avenue

Relocate Bayfront Highway between existing alignment and present Kamehameha Ave., starting at Waianuenue Avenue intersection extending southeast to merge with existing 4-lane Kam. Ave. just southeast of Ponahawai Street. Estimated total length = 2,100 LF, reconstruct signalized intersections with Waianuenue Ave and Ponahawai Street.

CONSTRUCTION	Qty.	Units	Unit Cost	Total Cost	
New 4-lane roadway	4,200	LF	$900	$3,780,000	
Signalized T intersections at Waianuenue and Ponahawai Streets	2	EA	$200,000	$400,000	
Mobilization	FA	FA		$418,000	
Traffic Control	FA	FA		$209,000	
Environmental Controls	FA	FA		$104,500	
			Estimated Construction Cost Total =	$4,911,500	a
			Contingencies (5%*a) =	$245,600	b
			Construction Engineering (15%8(a+b)) =	$773,600	c
			Administration Non-participating (40%*c) =	$309,400	
TOTAL CONSTRUCTION				**$6,240,100**	
PLANNING & PERMITTING (15%*a)				**$736,700**	
ENGINEERING & DESIGN (15%*a)				**$736,700**	
R/W ACQUISITION, 2100 LF x 80'				**$500,000**	
TOTAL COST FOR ALTERNATIVE				**$8,213,500**	

Assumptions
Roadway construction cost estimated at $4.5 to $5 million per mile

Signalized T intersection cost is estimated

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