Section 401 Water Quality Certification Application

KAWELA BRIDGE REPLACEMENT PROJECT (Federal Aid Project No. BR-0450(8)

Prepared for:

State of Hawaii,
Department of Transportation

October 2010

MUNEKIYO HIRAGA, INC.

Section 401 Water Quality Certification Application
for
Kawela Bridge Replacement Project
(Federal Aid Project No. BR-0450(8)

INDEX

1. SECTION 401 WATER QUALITY CERTIFICATION APPLICATION FORM

State of Hawaii
Department of Health
Clean Water Branch

CWB USE ONLY
WQC No.: _____ Engineer: _____
Date Received: _____

CWB-WQC Application

Information Required for the Section 401 Water Quality Certification (WQC)

Before completing this form, read the Guidelines for CWB-WQC Application.

❀ If mail is not received at the street address, provide the mailing address(es) in Item 14, Additional Information.

1. Owner Information (see Guidelines for CWB-WQC Application - Note 1)

Legal Name: State of Hawaii, Department of Transportation

Street Address ❀: 869 Punchbowl Street, Room 513

City, State and Zip+4 Code: Honolulu, Hawaii 96813

Contact Person & Title: Edwin Sniffen, Highways Administrator

Phone No.: (808) 587-2220 Fax No.: (808) 587-2340

2. General Contractor Information (see Guidelines for CWB-WQC Application - Note 2)

To be submitted to CWB within seven (7) calendar days prior to the construction commencement date.

Name: _____

Street Address ❀: _____

City, State and Zip+4 Code: _____

Contact Person & Position Title: _____

Phone No.: ( ) _____ Fax No.: ( ) _____

3. Emergency Contact Information (see Guidelines for CWB-WQC Application - Note 3)

a. Company/Organization Name: State of Hawaii, Department of Transportation

Contact Person & Title: Stephen T. Rogers, Construction Maintenance Supt. VI

Phone No.: (808) 873-3372 Phone No.: (808) 284-9662

To be submitted to CWB within seven (7) calendar days prior to the construction commencement date.

b. Company/Organization Name: _____

Contact Person & Title: _____

Phone No.: _____ Phone No.: _____

4. Project Site Information (see Guidelines for CWB-WQC Application - Note 4)

Project Name: Kawela Bridge Replacement

Government Project/Job No. (as applicable): Federal Aid Project No. BR-0450(8)

Street Address ❀: Kamehameha V Highway Milepost 5.1

City, State and Zip+4 Code: Kaunakakai, Hawaii 96748

Contact Person & Title: Stephen T. Rogers, Construction & Maintenance Supt. VI

Phone No.: (808) 873-3372 Fax No.: (808) 873-3544

Island: Molokai

Tax Map Key Number(s)			
Zone	Section	Plat	Parcel(s)
5	4	001	027 and 023

5. Associated Permits or Licenses (see Guidelines for CWB-WQC Application - Note 5)

Provide the type(s), status, corresponding file number(s), and legal authorization(s) of any existing or pending permits or licenses:

a. Department of the Army (DA) Permit or License: DA Permit Application No. DOH-2006-00500

b. Section 402 NPDES Permit: Filed Under Separate Cover (Permit No. HI 0021841; NOI Form F and NOI Form G submitted in September 2010 (Revised)

c. RCRA Permit (Hazardous Wastes): Not Applicable

d. Facility on SARA 313 List (identify SARA 313 chemicals on site):

Not Applicable

e. Other (Specify): See **Attachment "A"**

6. Receiving State Water Information (see Guidelines for CWB-WQC Application - Note 6)

a. Name: Kawela Stream, Pacific Ocean, South Molokai Coast, Kalohi Channel

Classification: (check the appropriate space(s))

Inland: Class 1 ____ Class 2 ____ Estuary ____

Marine: Class AA __X__ Class A ____ Embayment ____

Describe the associated existing uses at the "discharge" location(s):

Kamehameha V Highway bridge and undeveloped land.

b. Name: _____

Classification: (check the appropriate space(s))

Inland: Class 1 _____	Class 2 _____	Estuary _____
Marine: Class AA _____	Class A _____	Embayment _____

Describe the associated existing uses at the "discharge" location(s):

7. Project Description (see Guidelines for CWB-WQC Application - Note 7)

a. Project Site Coordinates

Latitude: 21°03' 53.82" N Longitude: 156 °56 ' 56.55" W

Latitude: 21°03' 53.31" N Longitude: 156 °56 ' 55.57" W

b. Describe the overall project scope and activities

See **Attachment "B",** Overall Project Scope and Activities.

c. Describe the "discharge" activity and the purpose of the proposed discharge activity

The discharge activity involves: pouring concrete for slab under the bridge to line the stream channel to facilitate maintenance and clean up of the stream channel after storm events; placement of 40 grouted micropiles, approximately 7-5/8 inches in diameter, to support the concrete slab; dumped rip-rap apron to protect the slab from underscouring; grout filled steel bollards upstream of concrete slab to restrict boulders from damaging concrete slab; construction of Cement Rubble Masonary (CRM) wingwalls to retain the banks; placement of grouted rubble paving (GRP) to stabilize the banks; pouring concrete abutments to support the bridge slab; and pouring concrete for two (2) 12-foot wide access ramps from the highway down to the concrete slab for maintenance purposes. A 8-inch waterline, with a concrete jacket will be placed in the streambed under the concrete slab on the upstream side of the bridge. A temporary detour route with two (2) 12-foot lanes will be built on the makai side of the highway to allow traffic to flow around the construction area. Under the detour route will be six (6) 42-inch concrete culverts to allow stream flow to pass the construction area during storm events. Rip-rap will be placed on the makai (south) and mauka (north) side of the detour route over the culverts. The detour route will be graded and filled with construction grade fill to bring it up to the highway grade (approximately +7 feet mean sea level) and paved with a minimum 1-inch asphalt surface and aggregate base.

d. List all "discharge" activities that the owner is seeking coverage for under this WQC application

Discharges produced during the new Kawela Bridge project will be both temporary and permanent. The temporary discharges are associated with the construction of the detour route. The permanent discharge activities involve actions associated with the concrete stream bed lining, maintenance access ramp and bridge support and bank stabilization. See **Table 1** and **Table 2**.

Table 1.

DISCHARGE ASSOCIATED WITH DETOUR ROUTE CONSTRUCTION			
	Amount		
Type	**CY**	**Lineal Feet**	**Square Feet**
a. Imported Borrow and Erosion Control[1]	342 CY		
b. Aggregate Base Course	280 CY	---	---
c. Temporary Rip-Rap	110 CY	---	
d. 6-42" Reinforced Concrete Pipe Class IV	---	361 lf.	---

[1] Fill and backfill will consist of non-expansive granular material, such as crushed coral or basalt

Table 2.

DISCHARGE ASSOCIATED WITH BRIDGE SUPPORT STRUCTURES AND STREAM BED IMPROVEMENTS			
	Amount		
Type	**CY**	**Lineal Feet**	**Square Feet**
a. Filter Material for Abutment	4 CY		
b. Aggregate Base for Channel Slab	85 CY		
c. Concrete in Bridge Abutment and Wingwalls Footings	65 CY		
d. Concrete in Channel Slab	245 CY		
e. Concrete in Access Ramps	50 CY		
f. 40-Grouted Micropiles (7 5/8-inch diameter) w/Permanent Casings and grouted fill		2,840 lf.	
g. 19-Structural Steel Bollards (6-inch Diameter) removable		138 lf.	
h. Grouted Rubble Paving (12-inch diameter minimum)			3,176 sq. ft.
i. Dumped Rip-Rap (15-inch diameter minimum)			3,502 sq. ft.
j. Waterline Concrete Jacket	25.4 CY		
k. Waterline Cushion	21.5 CY		
l. Waterline Backfill	70.0 CY		

e. Specify physical, chemical, biological, thermal, and any other pertinent characteristic of the "discharge" activity

The characteristics of the discharge activities entail placement of micro piles and grout filling of piles in the streambed to support the concrete slab lining the stream channel; pouring and placement of a concrete slab; placement of dumped rip-rap downstream of the slab; grouted rubble paving to stabilize bank slopes, backfilling of excavated areas. Discharge material will be comprised of excavated streambed substrate of Pulehu clay loam and basalt cobble and boulders. Discharge material will also include concrete liners to protect piping and trench cover. Specifically, the discharge will also include structural backfill material, which shall meet the requirements of Section 703-Aggregate of "Hawaii Specifications for Road, Bridge and Public Works Construction" 1994, State Department of Transportation, and 12-inch minimum diameter grouted rubble paving using river rocks and 15-inch minimum diameter dumped rip-rap. Sediment dislodged by construction activities is anticipated to be composed of filtered debris/sediment runoff predominantly of clay loam material. Construction will be carried out to the extent possible when the streambed is dry. To mitigate impact to water quality, downstream properties and the environment, a Best Management Practices (BMPs) Plan, water quality and marine biological surveys have been carried out, and a water quality assessment and water quality monitoring plan have been prepared and will be adhered to by the applicant before, during and after construction activities. See **Attachment "C", Attachment "D"**, and **Attachment "E"**, respectively.

8. Description of the Existing Environment and Potential Environmental Effects from the Construction Activities (see Guidelines for CWB-WQC Application - Note 8)

a. Describe the Existing Physical Environment and Potential Physical Environmental Effects

1. **Existing Physical Environment:** The streambed consists of fine sediments and rounded boulders. The banks are lined with monkeypod (Samanea saman) and Java plum (Syzgium cumini) trees, and the dry streambed is vegetated with various ruderal (weedy) herbaceous plants. There is a *muliwai* (coastal estuarine pond) extending approximately 100 ft. from the vicinity of the project site to the ocean shore. The muliwai has a sediment bottom and is bordered by a wide floodplain in both directions. The stream rarely has any flow at the project site during the dry season months.

2. **Potential Physical Environmental Effects:** The placement of the micropiles will involve drilling and placement of micropiles and filling shafts with grout. The stream channel slab lining will involve grading and placement of a fine gravel bed and pouring in place a concrete slab. The waterline crossing will involve trenching and placing concrete jacket to protect the waterline. Concrete abutments to support the bridge deck and CRM wingwalls and grouted rubble pavement to stabilize the bank will involve grading and

pouring concrete and placement of grout rubble paving on the bank slopes. Natural rocks (basalt) 12 inches in diameter and placed rip-rap (basalt rocks 15 inches in diameter) will be placed downstream of the concrete slab to prevent underscouring.

The temporary detour route involves grading and placement of six (6) 42-inch concrete culverts, placement of rip-rap cover over a portion of the culverts and filling the detour route area to existing grade of the highway.

Best Management Practices (BMPs) will be utilized to prevent and/or minimize impact on the downstream environment. Refer to **Attachment "C"**. Also, the applicant will adhere to a water quality monitoring plan prepared by AECOS, Inc. before, during, and after all construction activity. Refer to **Attachment "D"** and **Attachment "E"**, respectively. As such, adverse impacts to water quality are not anticipated by the proposed action.

b. Describe the Existing Chemical Environment and Potential Chemical Environmental Effects

Refer to **Attachment "D"**, Water Quality and Biological Surveys of Kawela Stream, Kawela, Molokai, Hawaii.

c. Describe the Existing Biological Environment and Potential Biological Environmental Effects

Refer to **Attachment "D"**, Water Quality and Biological Surveys of Kawela Stream, Kawela, Molokai, Hawaii.

d. Describe the Existing Uses and Its Potential Effects

No human activities involving recreation or marine activities occur in the Kawela Stream in and around the project site. The streambed, where the proposed action will occur, is typically dry, except during storm events. The streambed consists of sediments, cobbles and boulders. Scrub vegetation, grasses, and Monkeypod and Java plum trees border the stream banks. The streambed is part of a State highway right-of-way and is also on private property and not used for public recreation. The proposed action will facilitate maintenance of the streambed under the Kawela Bridge after storm events by State Department of Transportation crews. The proposed action is not anticipated to have an adverse impact on existing uses.

9. Project Schedule (see Guidelines for CWB-WQC Application - Note 9)

a. Provide the estimated date or dates on which the activity will begin and end:

Estimated start date: May 14, 2011
Estimated completion date: May 14, 2013

b. Provide the date or dates that the discharge(s) will take place:

Temporary detour route: July 5, 2011 to December 14, 2012
Stream channel lining: Phase I: December 1, 2011 to January 16, 2012
Phase II: April 6, 2012 to May 22, 2012
Phase III: October 28, 2012 to November 17, 2012
Phase IV: January 12, 2013 to February 1, 2013

10. Site-Specific Best Management Practices (BMP) Plan (see Guidelines for CWB-WQC Application - Note 10)

The BMPs Plan shall, at a minimum, include the following:

a. Maps are attached _X_ Yes __No Refer to **Attachment "A"**

b. Site Characterization

1. Refer to **Attachment "D"**.
2. See **Attachment "F"**, Construction Phasing Plan.

c. Construction Sequence and Duration

Refer to **Attachment "F"**, Construction Phasing Plan, Sheets C2.01 and C2.02.

d. Construction Method

Refer to **Attachment "F"**, Construction Phasing Plan.

e. Characteristics of the discharge and potential pollutants associated with the proposed construction activity. See **Table 3** and **Table 4**, below.

Table 3.

CONSTRUCTION ACTIVITY ASSOCIATED WITH TEMPORARY DETOUR ROUTE					
		Quantity			Duration
Source	Composition	CY	Lineal Feet	Square Feet	Months (mos.)
a. Imported Borrow and Erosion Control	Fill and backfill will consist of non-expansive granular material such as, streambed substrate crushed coral or basalt	342 CY			12-18 mos.
b. Aggregate Base Course		280 CY	---	---	12-18 mos.
c. Temporary Rip-Rap		---	---	819 sq. ft.	12-18 mos.
d. 42" Reinforced Concrete 6-Pipe Class IV	Portland Cement	---	361 lf.	---	12-18 mos.

Table 4.

CONSTRUCTION ACTIVITY ASSOCIATED WITH BRIDGE SUPPORT STRUCTURES AND STREAM BED IMPROVEMENTS					
		Amount			Duration
Type	Composition	CY	Lineal Feet	Square Feet	Months (mos.)
a. Filter Material for Abutment	Geotextile material, sand and gravel	4 CY			Permanent
b. Aggregate Base for Channel Slab	Structural stone and gravel	85 CY			Permanent
c. Concrete in Bridge Abutment and Wingwalls Footings	Portland cement and aggregate	65 CY			Permanent
d. Concrete in Channel Slab	Portland cement and aggregate	245 CY			Permanent
e. Concrete in Access Ramps	Portland cement and aggregate	50 CY			Permanent
f. Grouted Micropiles (7 5/8-inch diameter) 40-w/Permanent Casings and grouted fill	Structural Steel		2,840 lf.		Permanent
g. Structural Steel for 19, 6-inch diameter Bollards	Structural Steel		138 lf.		Permanent
h. Grouted Rip-Rap (12-inch diameter)	Basalt Boulders			3,176 sq. ft.	Permanent
i. Dumped Rip-Rap (15-inch diameter)	Basalt Boulders			3,502 sq. ft.	Permanent

f. Characteristics of the dredged/excavated material. See **Table 5**, below.

Table 5

Source	Composition	Quantity	Duration
1. Roadway Excavation	Scrub vegetation and grasses, boulders, and cobbles	181 CY	5 days
2. Trench Excavation for waterline	Streambed silt, boulders and cobbles	226 CY	3 days
3. Excavation for dumped rip-rap	Streambed silt, boulders, and cobbles	260 CY	3 days
4. Structural excavation for CRM retaining walls	Streambed silt, boulders, and cobbles	640 CY	5 days
5. Structural excavation for wingwalls	Streambed silt, boulders, and cobbles	42 CY	1 day
6. Structural excavation for channel slab	Streambed silt, boulders, and cobbles	1,120 CY	10 days

g. Proposed control measures and/or treatment

1. All dredged spoils will be temporarily placed within staging area and removed from project site on a daily basis by contractor and disposed at an off-site location. Contractor will not be permitted to stockpile dredged spoils within the construction staging area longer than one (1) working day.
2. Refer to Best Management Practices (BMPs) Plan, **Attachment "C"**.
3. Refer to **Attachment "G"**, Erosion Control Notes and Erosion Control Plan

11. Applicable Monitoring and Assessment Plan (see Guidelines for CWB-WQC Application - Note 11)

The Applicable Monitoring and Assessment Plan shall, at a minimum, include the following:

a. Description of the methods and means being used or proposed to monitor the quality and characteristics of the discharge

Refer to **Attachment "E"**, Applicable Monitoring and Assessment Program.

b. Description of the methods and means being used to monitor/maintain all pollutant control measures

Refer to **Attachment "E"**.

c. Reporting requirements

Refer to **Attachment "E"**.

d. A narrative of how the monitoring results will be used to demonstrate whether or not the project construction activity was in compliance with the applicable State water quality standards

Refer to **Attachment "E"**.

12. Mitigation/Compensation Plan (see Guidelines for CWB-WQC Application - Note 12)

Not applicable.

13. Supporting Documents (see Guidelines for CWB-WQC Application - Note 13)

List and submit applicable maps, plans, specifications, copies of associated permits or licenses, federal applications, Environmental Assessments or Environmental Impact Statements, as applicable, etc.

Document Title	Document Date
a. Attachment A, List of Permits and Status	November 2009
b. Attachment B, Overall Project Scope and Activities	November 2009
c. Attachment B, Storm Drainage Calculations, Exhibit B-8	August 2010
d. Attachment C, Best Management Practices Plan	November 2009
e. Attachment D, Water Quality and Biological Suveys of Kawela Stream, Molokai, Hawaii	September 2006
f. Attachment E, Application Monitoring and Assessment Program for Clean Water Act (CWA) Section 401, Water Quality Certification	August 2010
g. Attachment F, Construction Phasing Plan	July 2008
h. Attachment G, Erosion Control Notes and Erosion Control Plan	July 2008

14. Additional Information (see Guidelines for CWB-WQC Application - Note 14)

Not Applicable

15. Statement of Choice of Publication (see Guidelines for CWB-WQC Application - Note 15)

Check One:

_X_ Public Notice of Proposed Action

___ Public Notice of Public Hearing

___ Not Applicable. The applicant is seeking WQC coverage under authorization of WQC File No. _____ for a DA permit authorization under the following (provide applicable information):

DA NWP No. _____

DA GP No. _____

DA PGP No. _____

16. Authorization of Representative (see Guidelines for CWB-WQC Application - Note 16)

Check one and complete the appropriate space(s). Alteration of this item will result in the invalidation of the authorization statement(s).

a. This statement authorizes the named individual or any individual occupying the named position of the company/organization listed below to act as our representative to process the required Section 401 WQC Application to discharge to navigable waters from the subject project. The Owner hereby agrees to comply with and be responsible for all Section 401 WQC conditions.

Company/Organization Name: Munekiyo & Hiraga, Inc.

Street Address ❀: 305 High Street, Suite 104

City, State and Zip Code+4: Wailuku, Hawaii 96793

Authorized Person & Title: Mich Hirano, AICP, Vice President

Phone No.: (808) 244-2015 Fax No.: (808) 244-8729

b. This statement authorizes the named individual or any individual occupying the named position of the company/organization listed below to act as our representative to process the required Section 401 WQC Application to discharge to navigable waters from the subject project. Our representative is further authorized to fulfill all conditions of the Section 401 WQC. The Owner hereby agrees to comply with and be responsible for all Section 401 WQC conditions.

Company/Organization Name: _____

Street Address ❀: _____

City, State and Zip Code+4: _____

Authorized Person & Title: _____

Phone No.: _____ Fax No _____

c. This statement authorizes the named individual or any individual occupying the named position of the company/organization listed below to act as our representative to fulfill all conditions of the Section 401 WQC for the subject project. The Owner hereby agrees to comply with and be responsible for all Section 401 WQC Conditions.

Company/Organization Name: State of Hawaii, Department of Transportation, Highways Division

Street Address ❀: 650 Palapala Drive

City, State and Zip Code+4: Kahului, Hawaii 96732

Authorized Person & Title: Ferdinand Cajigal, Maui District Engineer

Phone No.: (808) 873-3538 Fax No.: (808) 873-3544

d. A separate statement is attached. Yes ____ No X

17. Certification (see Guidelines for CWB-WQC Application - Note 17)

Alteration of this item will result in the invalidation of this application. **The person certifying this CWB-WQC Application must meet one of the following descriptions and be employed by the owner listed in Item 1.**

___ I certify that for a municipal agency, I am a principal executive officer or ranking elected official.

X I certify that for a state agency, I am a principal executive officer or ranking elected official.

___ I certify that for a federal or other non-federal public agency, I am a principal executive officer or ranking elected official.

___ I certify that for a federal agency, I am the chief executive officer of the agency, or I am the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

___ I certify that I am a general partner for a partnership.

___ I certify that I am the proprietor for a sole proprietorship.

___ I certify that for a corporation or association, I am the President, Vice President, Secretary, or Treasurer of the corporation or association and in charge of a principal business function, or I perform similar policy or decision making functions for the corporation or association:

___ I certify that for a corporation, I am the Manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), and authority to sign documents has been assigned or delegated to me in accordance with corporate procedures.

___ I certify that for a trust, I am a trustee.

In accordance with the State of Hawaii, Department of Health, Water Quality Standards, there is reasonable assurance that the proposed activity will be conducted in such a manner which will not violate the basic water quality criteria applicable to all waters and the specific water quality criteria applicable to the class of navigable waters where the proposed "discharge" would take place.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: _____ Date: OCT 11 2010

Printed Name & Title: Michael D. Formby, Interim Director of Transportation

Company/Organization Name: State of Hawaii, Department of Transportation

Phone No.: (808) 587-2150 Fax No.: (808) 587-2167

CWB-WQC Application Checklist		
If any item is listed as "no," attach a sheet with the reason for its exclusion from the Section 401 WQC Application submittal.		
Item Number	**Description**	**Is item addressed? (yes/no)**
1.	Owner Information	Yes
2.	General Contractor Information	To be Provided
3.	Emergency Contact Information	Yes
4.	Project Site Information	Yes
5.	Associated Permits or Licenses	Yes
6.	Receiving State Water Information	Yes
7.	Project Description	Yes
8.	Description of the Existing Environment and Potential Environmental Effects from the Construction Activities	Yes
9.	Project Schedule	Yes
10.	Site-Specific BMPs Plan	Yes
11.	Applicable Monitoring and Assessment Plan	Yes
12.	Mitigation/Compensation Plan	Yes
13.	Supporting Documents	Yes
14.	Additional Information	Not Applicable
15.	Statement of Choice of Publication	Yes
16.	Authorization of Representative	Yes
17.	Certification	Yes
18.	Filing Fee ($1000.00) is attached	Yes
19.	Number of copies with supporting documents submitted	
	a. One (1) copy for projects on Oahu with owner's original signature	Not applicable
	b. Two (2) copies for projects on islands other than Oahu (one with owner's original signature)	Yes

ATTACHMENT A.

Associated Permits or Licenses

ATTACHMENT "A"

5. Associated Permits or Licenses.
e. Other (Specify):

AGENCY	TYPE APPROVAL	IDENTIFICAT-ION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
State Department of Transportation	Chapter 343, HRS FONSI	Federal Aid Project No. BR-0450(8)		7.23.09	
Federal Highway Administration	Categorical Exclusion	Federal Aid Project No. BR-0450(8)		8.12.09	
Molokai Planning Commission	Special Management Area Use Permit	SM1 2009/0002	3.10.09	9.28.09	
Board of Land and Natural Resources	Conservation District Use Permit	CDUA: MO-3537	1.29.10	5.13.10	
Department of Army	Section 404 Clean Water Act	POH-2006-00500	2.1.10	In review (NWP14)	
Commission on Water Resource Management	Stream Channel Alteration Permit	SCAP 2588.4	2.4.10	3.15.10	
DBEDT, Office of Planning	Coastal Zone Management Consistency Approval	P-13126	2.4.10	10.4.10	
State Department of Health, CWB	NPDES	HI 0021841	9.22.10	In review	
	NOI Form F	HI 002184I	9.22.10	In review	
	NOI Form G	HI 0021841	9.22.10	In review	

ATTACHMENT B.

Describe Overall Project Scope and Activities

ATTACHMENT "B"

7.b. Describe the overall project scope and activities.

PROJECT LOCATION, EXISTING USE AND OWNERSHIP

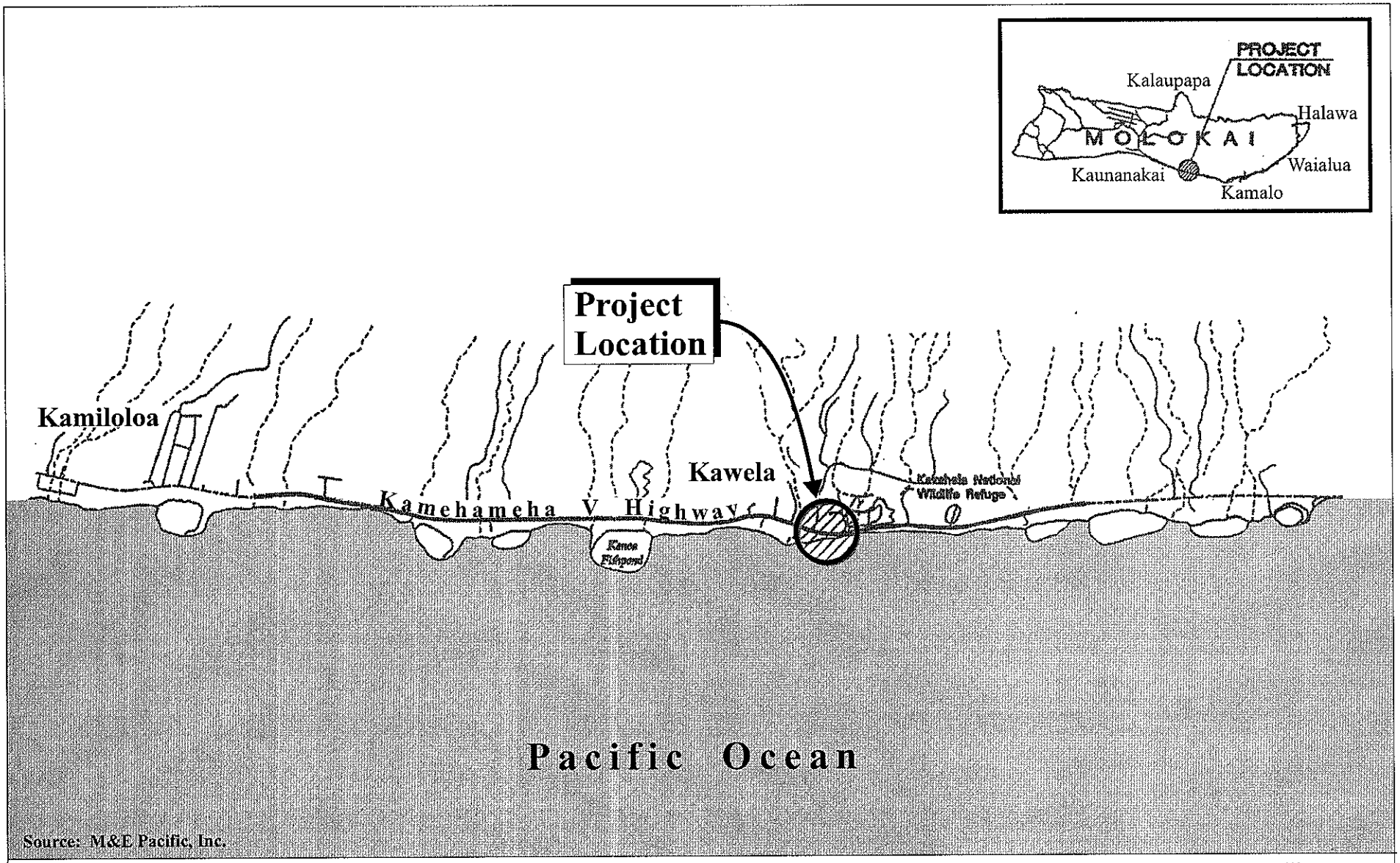
The State of Hawaii, Department of Transportation (HDOT) proposes to replace Kawela Bridge, located between Milepost 5.110 and Milepost 5.118, on Kamehameha V Highway (Route 450) on the island of Molokai, Hawaii. The highway follows the southeastern coastline of Molokai from Kaunakakai to Halawa. See **Figure 1** and **Figure 2**. The existing bridge is 44 feet long and 28 feet wide and does not have a dedicated pedestrian or bike lane.

The highway right-of-way is owned by the State of Hawaii, Department of Transportation. Stream bank improvements and a temporary detour route will be constructed to the south of the bridge on property identified by TMK (2) 5-4-001:027 (Parcel 27). This portion of the parcel is presently undeveloped and contains a coastal pond. This portion of the project area is located in the State Land Use "Conservation" district. The subdistrict designation is "Limited". The parcel is owned by Pamela Phoebe Parker and Fred Ronald Parker. On the northern side of the bridge beyond the highway right-of-way, streambed improvements will be carried out on lands identified by TMK (2) 5-4-001:023 (Parcel 23). The lands are currently undeveloped and owned by Molokai Properties Limited.

PROPOSED ACTION

The proposed project calls for the demolition of the existing bridge and construction of a new bridge that will improve hydraulic capacity of the bridge and conform to current HDOT and American Association of State Highway and Transportation Officials (AASHTO) design standards and Federal Highway Administration (FHWA) standards. The proposed new bridge will be 56-feet long by approximately 47-feet wide with two (2) 12-foot wide lanes and bikeway/pedestrian walkway on each side. The new bridge will meet current HDOT/AASHTO and FHWA standards. See Longitudinal Section, Sheet No. S1.2, and Typical Road Sections, Sheet No, C1.13, **Exhibit "B-1"**. (The 47-foot width is the overall width measured from the outside edges of the concrete deck.) Improvements also include a new 20-foot approach slab at both ends of the bridge, guard rails and new concrete abutments. The replacement bridge will be constructed within the existing State right-of-way and the existing bridge elevation will be raised two (2) feet above the existing height.

The stream channel under the bridge will be lined with concrete for maintenance purposes. See Bridge Enlargement Plan, Sheet No. C4.03, **Exhibit "B-2"**. A 2-inch existing waterline attached to the existing bridge will be replaced with an 8-inch waterline crossing under the concrete channel slab on the upstream side of the bridge. See Waterline/Drainline Plan and Profile, Sheet No. C4.08, **Exhibit "B-3"**. Beyond the concrete liner, the stream embankment will be protected from erosion with grouted rubble pavement (GRP). A 12-foot wide concrete access ramp for maintenance will be constructed on both sides of the bridge. Also, portions of the CRM wall, concrete access ramp, and concrete channel slab will be constructed on Parcel 27, which is located in the Conservation District. The area of harden surface within the stream bed will be



Source: M&E Pacific, Inc.

Figure 1

Proposed Kawela Bridge Replacement

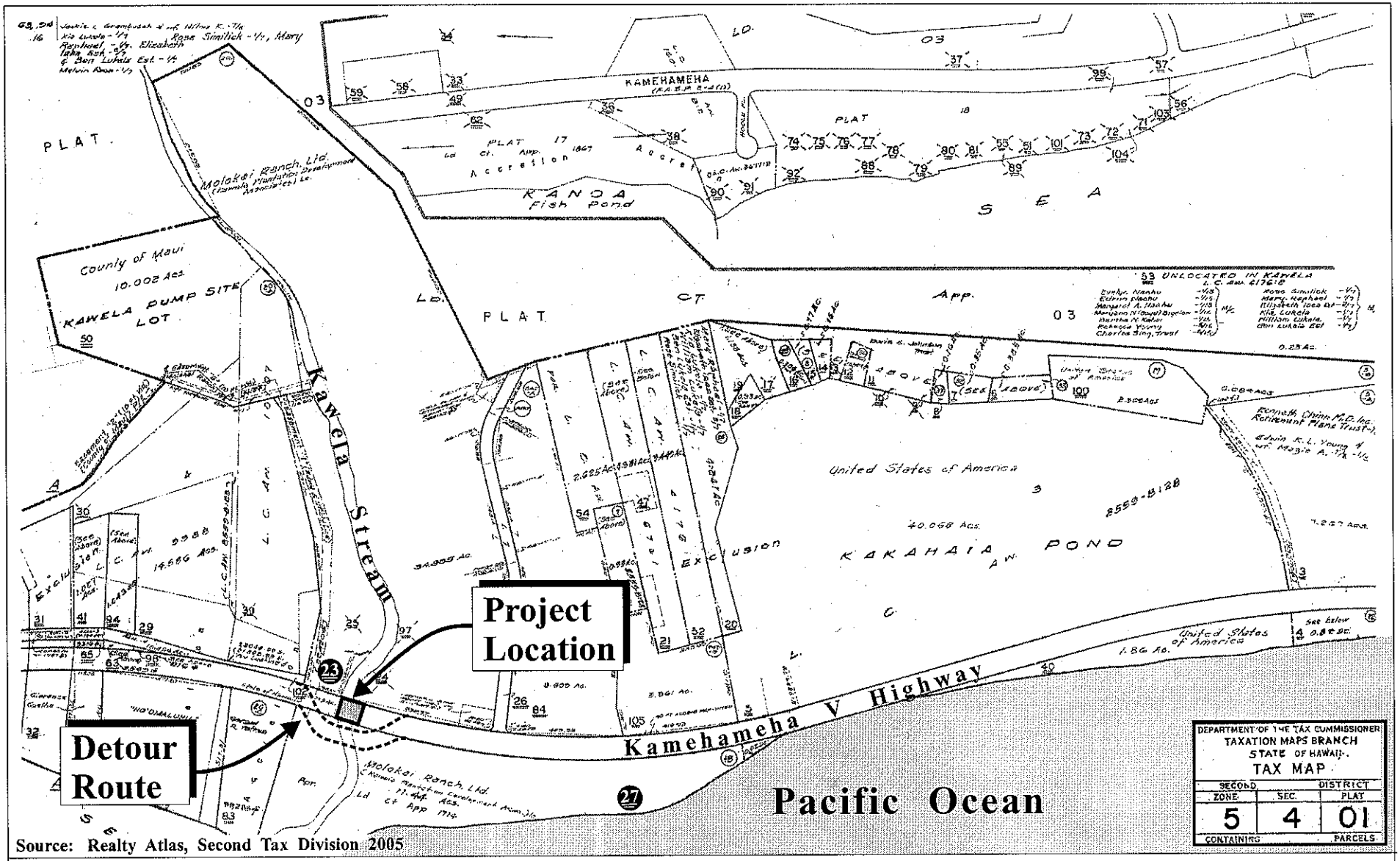
Regional Location Map

1000 0 Feet 500 2000

MUNEKIYO & HIRAGA, INC.

Prepared for: State of Hawaii, Department of Transportation

KAIHi/KawelaBridge/regionalloca



Source: Realty Atlas, Second Tax Division 2005

Figure 2

Proposed Kawela Bridge Replacement

Project Location Map

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: State of Hawaii, Department of Transportation

KAIHi/KawelaBridge/projectlocat

approximately 0.41 acre. The project will not result in any permanent loss of waters of the United States. A portion of the improvements upstream (north), consisting of the CRM walls, concrete access ramp, concrete channel slab, and 3-ft. high bollards, will be constructed on Parcel 23.

The overall site will be graded to match design elevations. See Grading Plan, Sheet Nos. C4.06 and C4.07, **Exhibit "B-4"**. A temporary construction detour route will be installed on the makai side of the new bridge to allow traffic to flow around the construction area. See Plan and Profile Detour Road, Sheet No. C3.02, **Exhibit "B-5"**. The detour route will require a construction easement over private property (Parcel 27) and the removal of existing vegetation. The detour route will provide two (2) lanes of traffic. Therefore, both lanes of Kamehameha V Highway will be open for traffic during the construction period. The design of the detour road shall include the use of six (6) 42-inch reinforced concrete pipe (RCP) culverts to allow stream flow. The RCP culvert capacity is approximately 540 cfs which is slightly more than the existing bridge capacity. Upon completion of the detour route, the existing bridge will be demolished. See Demolition Plan, Sheet No. C3.01, **Exhibit "B-6"**. The detour route will be decommissioned upon completion of the new Kawela Bridge and the land restored to the original condition, as practicable.

The following vegetation controls and restoration plan will be carried out for the project.

1. Existing ground cover will not be destroyed, removed or disturbed more than 20 calendar days prior to start of grading operation.

2. Temporary soil stabilization with appropriate vegetation shall be applied on areas that remain unfinished for more than thirty (30) calendar days, and permanent soil stabilization using vegetative controls shall be applied as soon as practical after final grading.

3. Site will be restored with permanent soil stabilization with perennial vegetation as soon as practical after final grading. See Landscape Plan, Sheet Nos. 1, 2 and 3, **Exhibit "B-7"**. Other disturbed areas not landscaped will be stabilized by hydromulch spay to induce vegetative cover.

Portions of the highway approaching each side of the bridge will be reconstructed to transition from the existing roadway to the new bridge. The shoulders will be widened and paved to meet the new bridge width. The road elevation will be gradually raised from existing grade to plus two (2) feet to meet the new bridge elevation. Guard rails will be installed along both sides of the roadway.

New drainage improvements will also be carried out. Drain inlets on all four (4) corners of the bridge will be installed. Refer to Waterline/Drainage Line Plan and Profile, **Exhibit "B-3"** and see Drainage Calculations, **Exhibit "B-8"**, attached. These inlets will carry stormwater runoff from the bridge into an 18-inch concrete channel and empty out through the stream channel walls.

ATTACHMENT "B"

List of Exhibits

Exhibit B-1. **Longitudinal Section, Sheet No. S1.2 and Typical Road Sections, Sheet No. C1.13**

Exhibit B-2. **Bridge Enlargement Plan, Sheet No. C4.03**

Exhibit B-3. **Waterline/Drainline Plan and Profile, Sheet No. C4.08**

Exhibit B-4. **Grading Plan, Sheet Nos. C4.06 and C4.07**

Exhibit B-5. **Detour Road Plan and Profile, Sheet No. C3.02**

Exhibit B-6. **Demolition Plan, Sheet No. C3.01**

Exhibit B-7. **Landscape Plan, Sheet Nos. 1, 2, and 3**

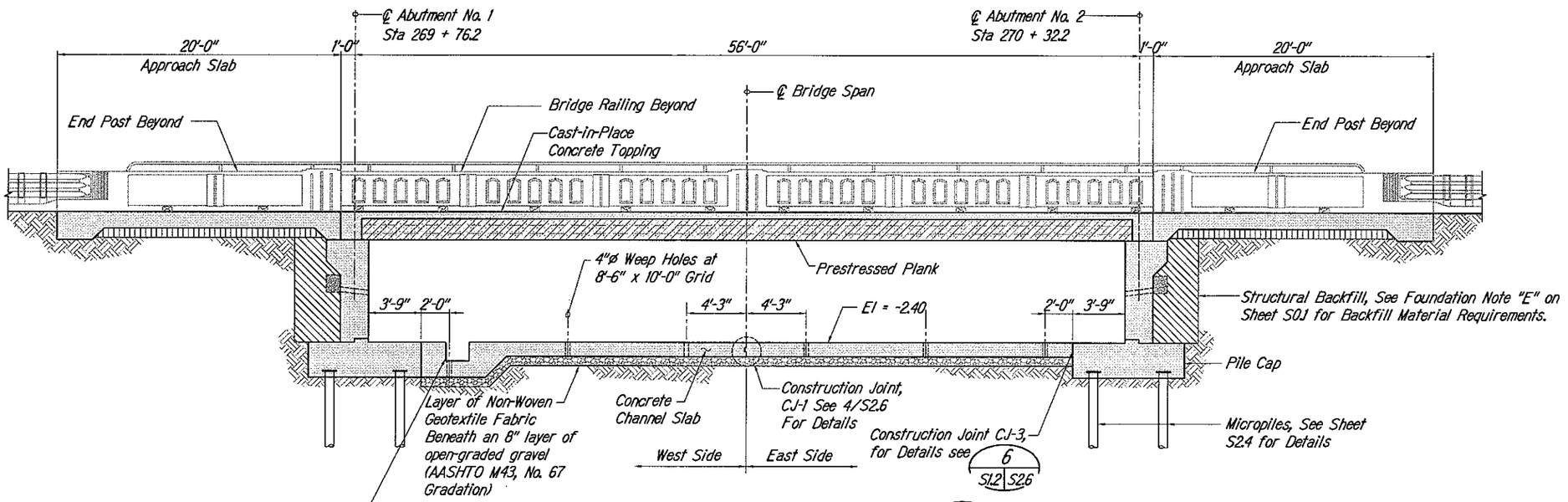
Exhibit B-8. **Drainage Calculations**

EXHIBIT B-1.

Longitudinal Section, Sheet No. S1.2 and Typical Road Sections, Sheet No. C1.13

Note: The sequence of construction and the requirement to backfill behind the abutments according to a prescribed schedule will not affect construction phasing or the SSBMP's that are proposed. The construction phasing as shown on the Phasing Plans (Attachment F, Sheets C2.01 and C2.02), including the installation and shifting of SSBMP's, account for the backfilling requirements as described in Note A on Sheet S1.2.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	55	86



LONGITUDINAL SECTION ALONG BASE LINE 1 - S1.2

Scale: 1/4" = 1'-0"

Notes:

A. The sequence of construction is the responsibility of the contractor. The contractor shall conduct their construction activities such that the micropiles are not subjected to lateral loads, such as backfilling behind abutments, until after the channel slab beneath the bridge is in place and has sufficiently cured. The following construction sequence shall be followed to avoid imposing lateral loads on the micropiles during construction:
   1. Excavate for and construct abutments and channel slab according to Phasing Plan, Sheets C2.01 and C2.02.
   2. The abutments shall not be backfilled until after the channel slab is in place and has cured for at least 7 days.

B. Placement and repositioning of BMP's that will be used for channelizing stream flow during the various phases of the work shall be the responsibility of the contractor. Refer to BMP Notes, Sheets C2.01 and C2.02.

C. Channel slab subgrade shall be prepared by proof-rolling the soil subgrade to a firm condition.

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2010
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BRIDGE LONGITUDINAL SECTION

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

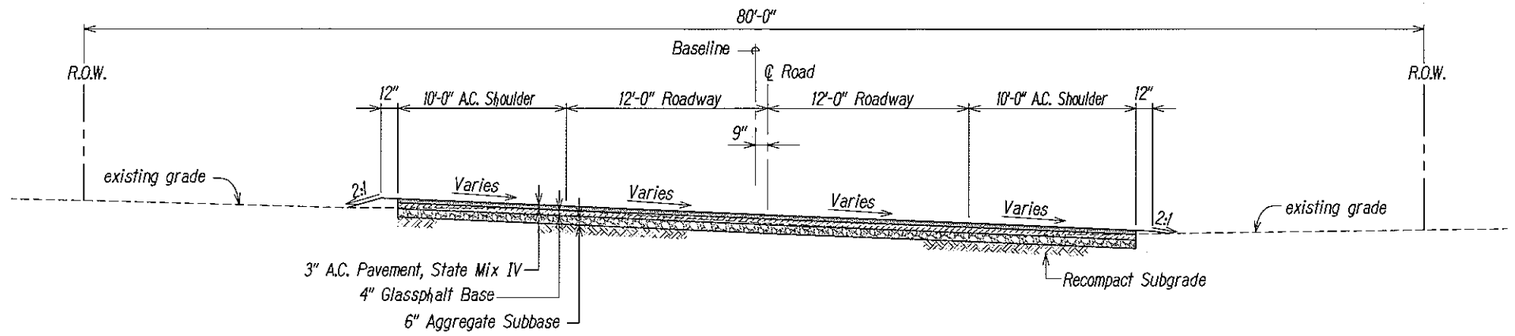
Scale: AS NOTED Date: June, 2010

SHEET No. S1.2 OF 86 SHEETS

P:\Drafting\2010-07-21_1528 Kawela Bridge\1528_S-1-2.dwg, 7/21/2010 2:08:20 PM, ramanaha, 1:1

EXHIBIT "B-1"

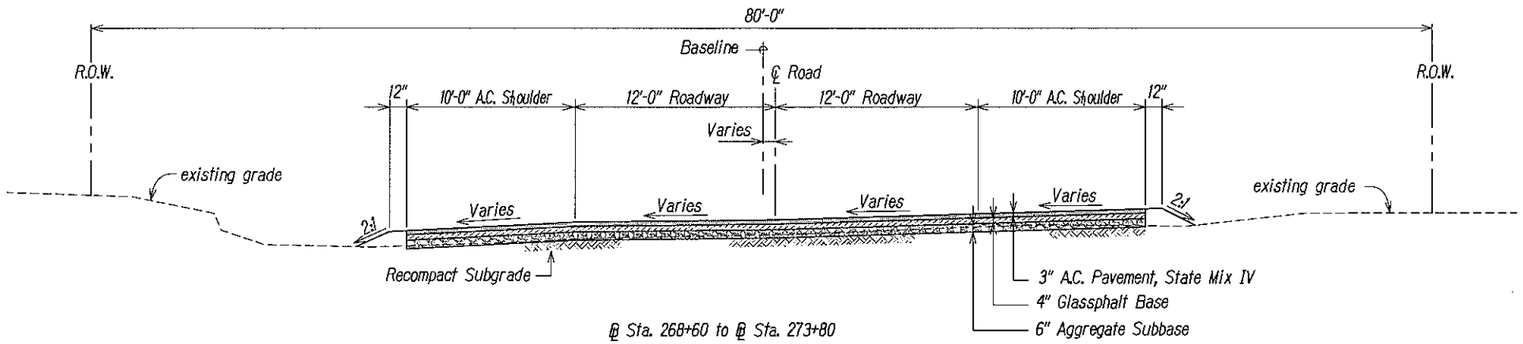
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	14	93



℄ Sta. 266+30 to ℄ Sta. 268+60

TYPICAL ROAD SECTION

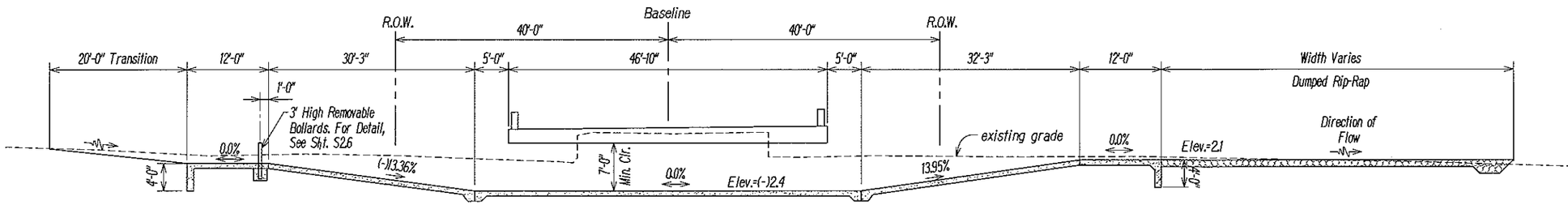
Scale: 1/4" = 1'-0"



℄ Sta. 268+60 to ℄ Sta. 273+80

TYPICAL ROAD SECTION

Scale: 1/4" = 1'-0"



TYPICAL BRIDGE SECTION

Scale: 1/8" = 1'-0"

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Kent R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL ROAD SECTIONS

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

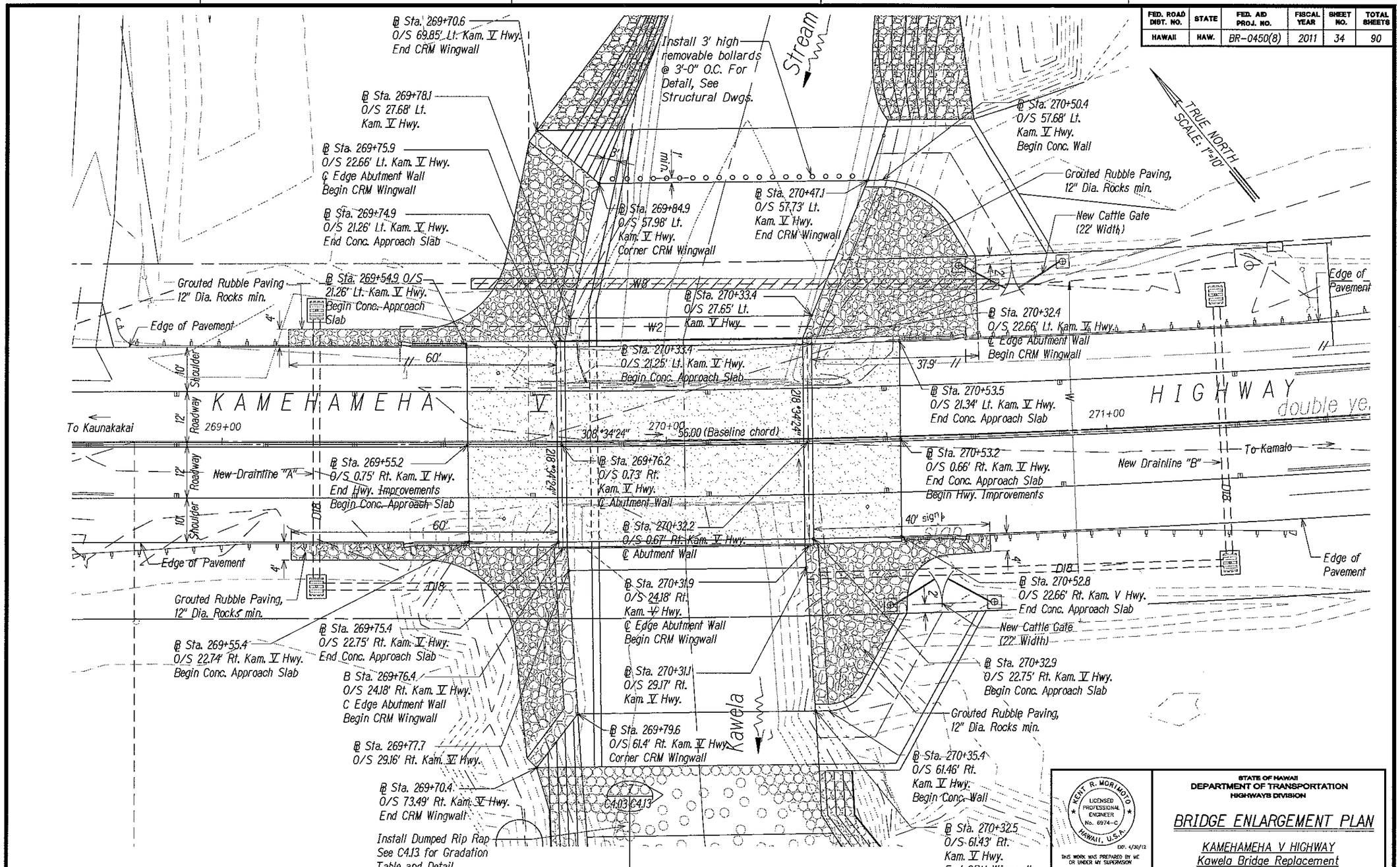
Scale: AS NOTED Date: June, 2010

SHEET No. C1.13 OF 93 SHEETS

EXHIBIT B-2.

Bridge Enlargement Plan, Sheet No. C4.03

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	34	90



BRIDGE ENLARGEMENT PLAN
Scale: 1" = 10'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BRIDGE ENLARGEMENT PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C4.03 OF 86 SHEETS

EXHIBIT "B-2"

EXHIBIT B-3.

Waterline/Drainline Plan and Profile, Sheet No. C4.08

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	35	90

Sta. 0+57.0 WL "A"
=℄ Sta. 268+93.1 Kam. V Hwy.
O/S 35.5' Lt.
1-8" 1/16 Bend
1-Concrete Block

Sta. 0+00 WL "A"
=℄ Sta. 268+38.7± Kam. V Hwy.
O/S 22.20' Lt.
Remove existing 8" Plug and Connect to existing 8" WL (Field Verify Depth and Location)
Material for Connection
1-8" Cap with 2 1/2" C.O.
1-Conc. Block
1-8" Sleeve, 12" Long

Sta. 0+15.0 WL "A"
=℄ Sta. 268+53.6 Kam. V Hwy.
O/S 22.02' Lt.
1-8" 1/16 Bend
1-Concrete Block

Contractor shall use exist. water meter to provide temporary irrigation for new landscaping within private property on west side of the bridge.
(See Landscaping Plans for additional requirements)

Sta. 0+62.0 WL "A"
=℄ Sta. 268+98.1 Kam. V Hwy.
O/S 35.5' Lt.

New joint utility pole #el02
290°29'2"
42.2'
309°17' → 15.00'

Sta. 0+62.24 DL "A"
=℄ Sta. 269+21.1 Kam. V Hwy.
O/S 32.74' Rt.
Construct New 3'x4' Grated Drop Inlet #2 Type 61614P with Steel Grate
Top=5.8
Inv.=1.38
For Details, See Std. Plan H-12 and H-16, (Typ.)

TMK: (2)5-4-01:27
(Fred Parker)

Sta. 0+00 Begin DL "A"
=℄ Sta. 269+21.1 Kam. V Hwy.
O/S 29.50' Lt.
Construct New 3'x4' Grated Drop Inlet #1 Type 61614P with Steel Grate
Top=5.5
Inv.=1.70

309°17' → 21.2.55'

Sta. 1+19.12 End DL "A"
=℄ Sta. 269+77.9 Kam. V Hwy.
O/S 32.76' Rt.
Cut Drain Line Flush w/ CRM Wall
Inv.=1.09

Sta. 1+58.31 End DL "B"
=℄ Sta. 270+31.2 Kam. V Hwy.
O/S 31.03' Rt.
Cut Drain Line Flush w/ CRM Wall
Inv.=0.71

TMK: (2)5-4-01:83
(Fred Parker)

Kawela

120 LF Reinforced Concrete Jacket

Cut and Plug

Cut and Plug

Provide Temporary 2" Waterline Service. Field Verify Location and Depth of existing 2" Waterline

Install Type "A" Water Lateral Service
TMK: (2)5-4-01:27 (Fred Parker)

New joint utility pole #el02X

Sta. 2+93.17 WL "A"
=℄ Sta. 271+31.2 Kam. V Hwy.
O/S 34.89' Lt.
1-1" Arv.
1-8" Plug with 2-1/2" C.O.
2-Type "F" MH with Concrete Collar
1-Concrete Block
Install Type "B" Water Lateral and Connect to Exist. 2-inch Waterline (Field Verify Depth and Location).
Install New 1" Meter and C.I. Box w/Concrete Collar.
Remove & Salvage Exist. 1" Meter by S.P. #31 and Return to DWS.

TRUE NORTH
SCALE: 1"=20'

To Kaunakakai

K A M E H A M E H A V H I G H W A Y

To Kamalo

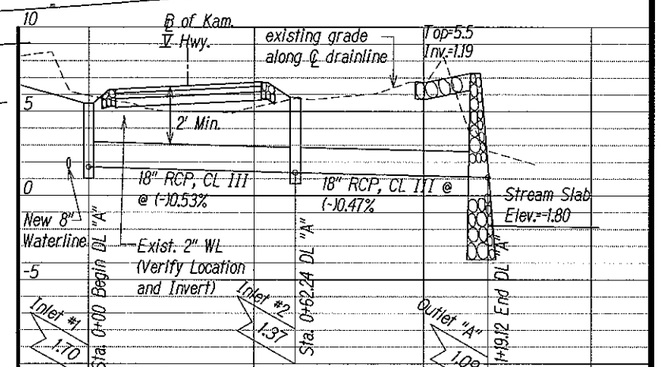
D18

Stream

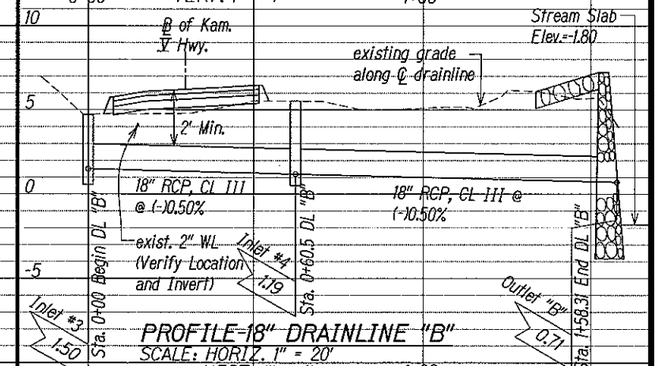
PLAN-8" WATERLINE AND 18" DRAINLINE
SCALE: 1" = 20'

Sta. 0+00 Begin DL "B"
=℄ Sta. 271+26.3 Kam. V Hwy.
O/S 30.56' Lt. Construct New 3'x4' Grated Drop Inlet #3 Type 61614P with Steel Grate
Top=4.7
Inv.=1.50

Sta. 0+60.5 DL "B"
=℄ Sta. 271+26.3 Kam. V Hwy.
O/S 30.56' Rt.
Construct New 3'x4' Grated Drop Inlet #4 Type 61614P with Steel Grate

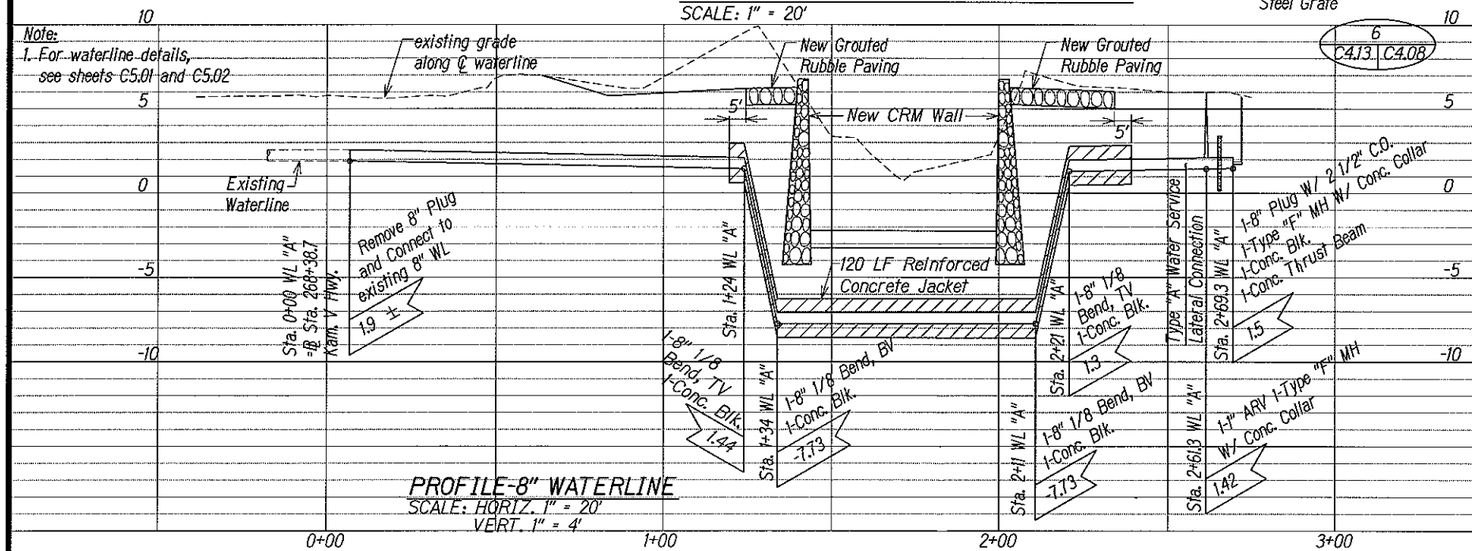


PROFILE-18" DRAINLINE "A"
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'



PROFILE-18" DRAINLINE "B"
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

Note:
1. For waterline details, see sheets C5.01 and C5.02



PROFILE-8" WATERLINE
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

6
C4.13 | C4.08

KENT R. MORINOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN AND PROFILE
8" WATERLINE/18" DRAINLINE

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

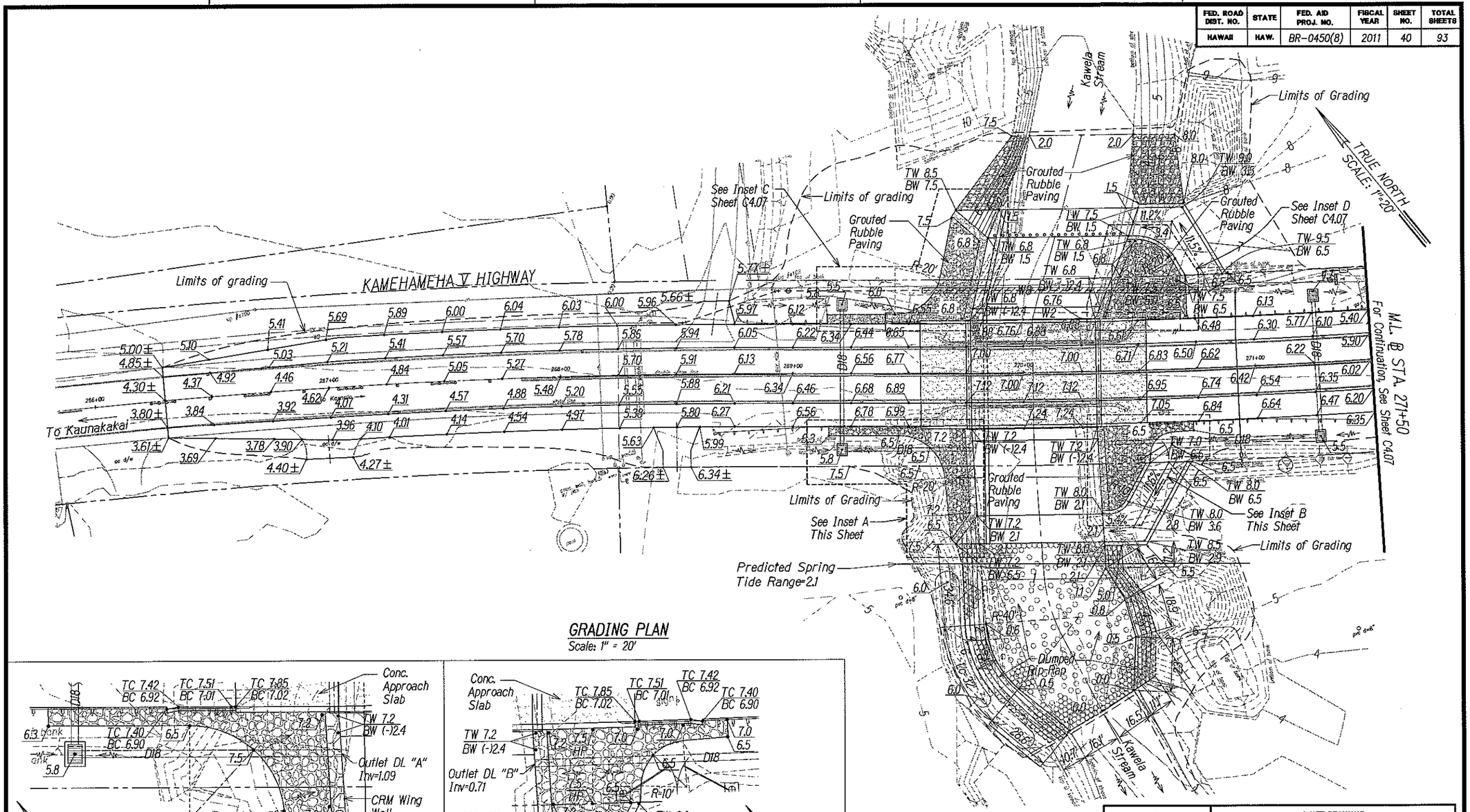
SHEET No. C4.08 OF 86 SHEETS

EXHIBIT "B-3"

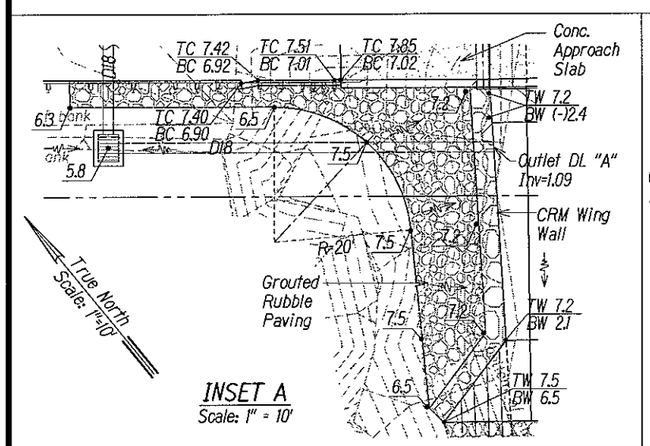
EXHIBIT B-4.

Grading Plan, Sheet Nos. C4.06 and C4.07

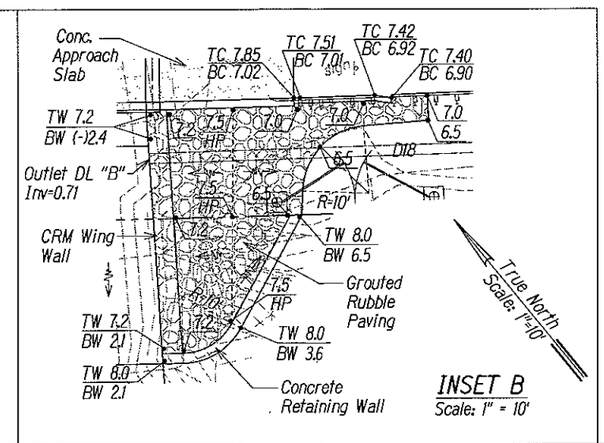
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	40	93



GRADING PLAN
Scale: 1" = 20'



INSET A
Scale: 1" = 10'



INSET B
Scale: 1" = 10'

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

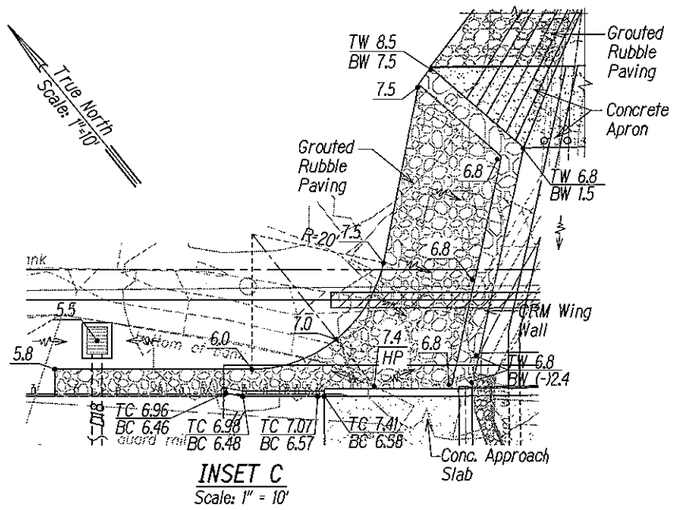
GRADING PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

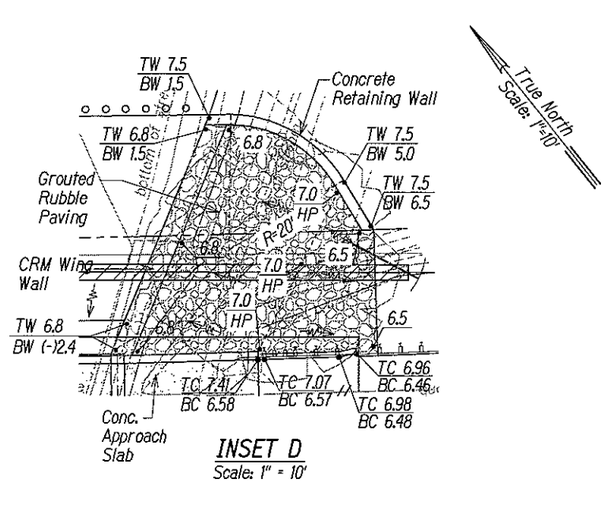
Scale: AS NOTED Date: June, 2010

SHEET No. C4.06 OF 93 SHEETS

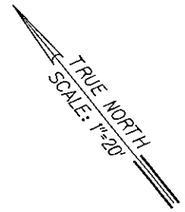
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	34	90

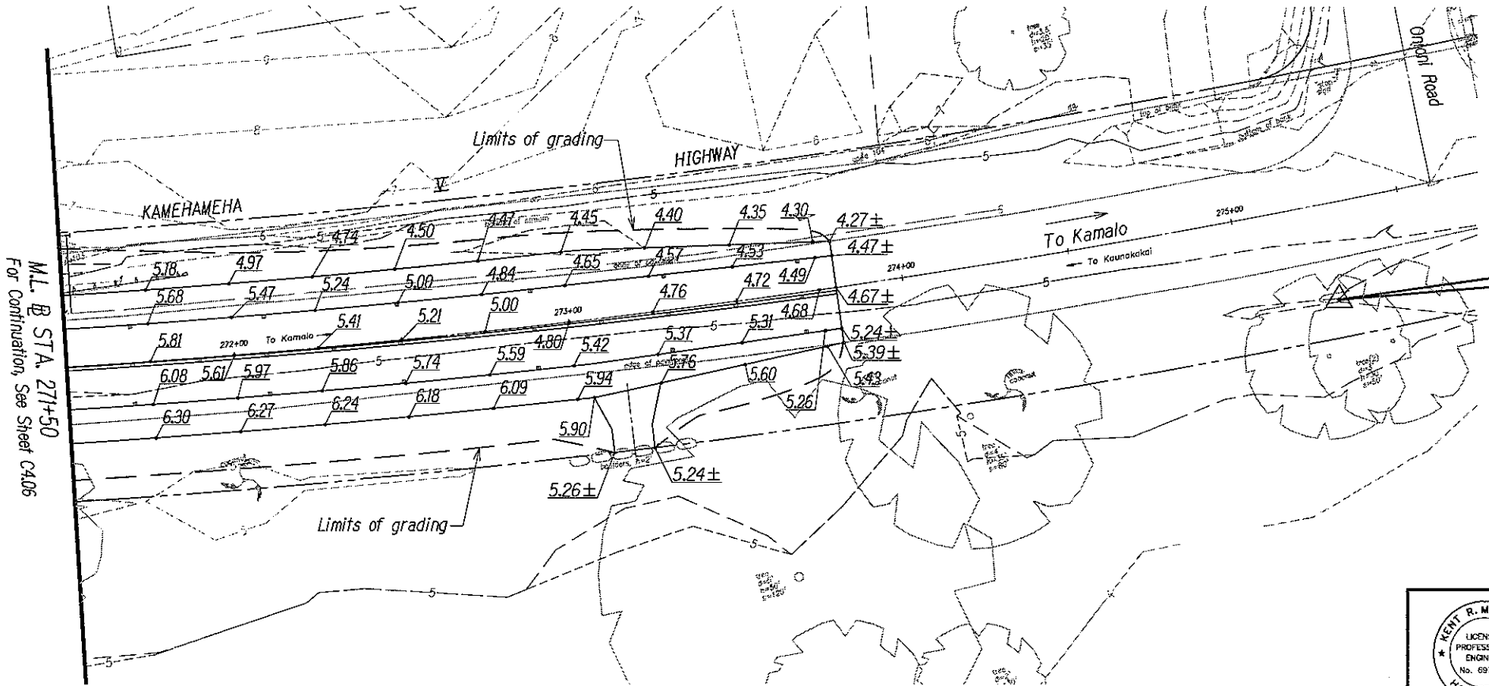


INSET C
Scale: 1" = 10'



INSET D
Scale: 1" = 10'





GRADING PLAN
Scale: 1" = 20'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

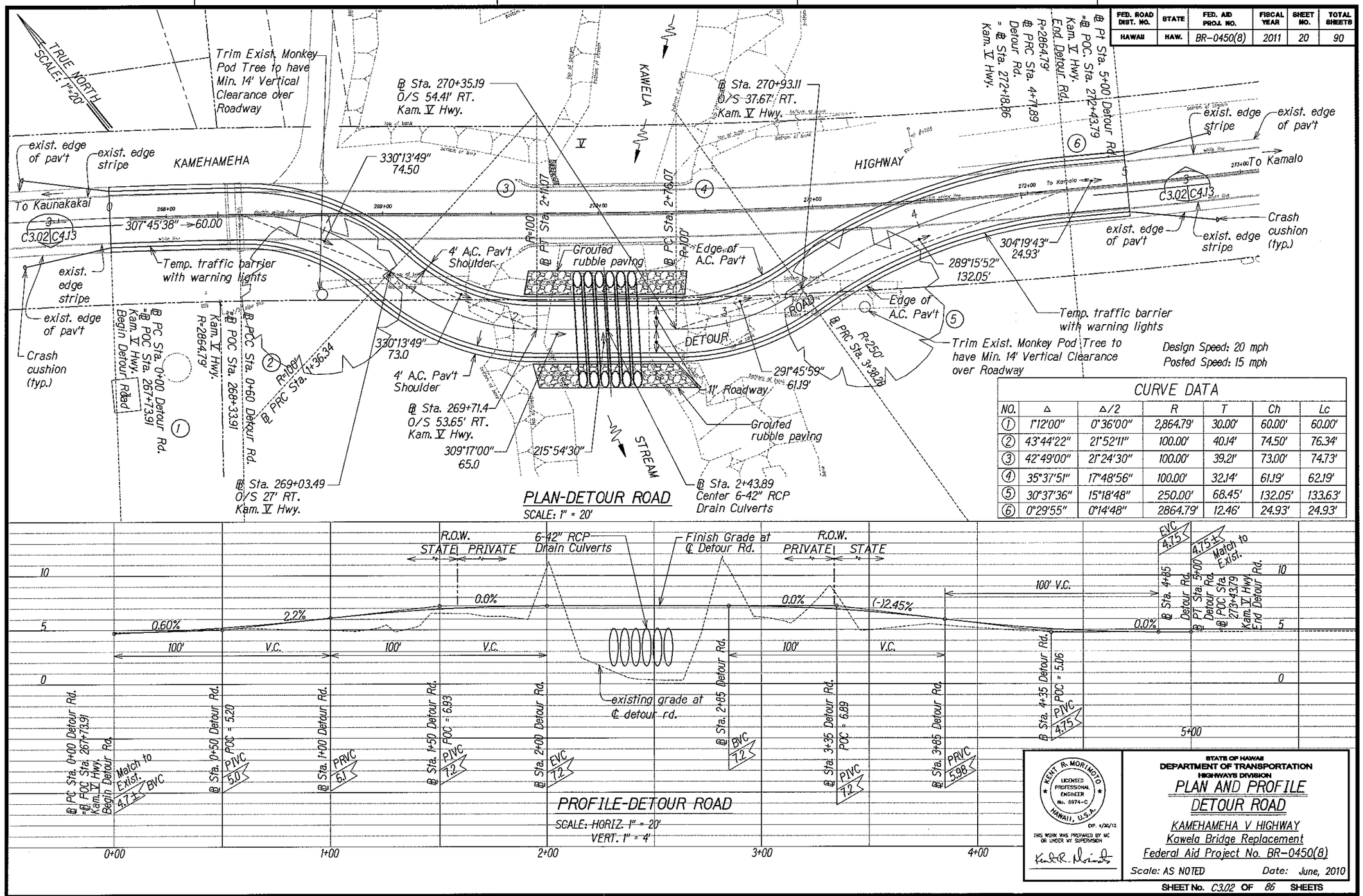
SHEET No. C4.07 OF 86 SHEETS

EXHIBIT "B-4"

EXHIBIT B-5.

Detour Road Plan and Profile, Sheet No. C3.02

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	20	90



CURVE DATA

NO.	Δ	Δ/2	R	T	Ch	Lc
①	1°12'00"	0°36'00"	2,864.79'	30.00'	60.00'	60.00'
②	43°44'22"	21°52'11"	100.00'	40.14'	74.50'	76.34'
③	42°49'00"	21°24'30"	100.00'	39.21'	73.00'	74.73'
④	35°37'51"	17°48'56"	100.00'	32.14'	61.19'	62.19'
⑤	30°37'36"	15°18'48"	250.00'	68.45'	132.05'	133.63'
⑥	0°29'55"	0°14'48"	2864.79'	12.46'	24.93'	24.93'

PLAN-DETOUR ROAD
SCALE: 1" = 20'

PROFILE-DETOUR ROAD
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN AND PROFILE
DETOUR ROAD

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

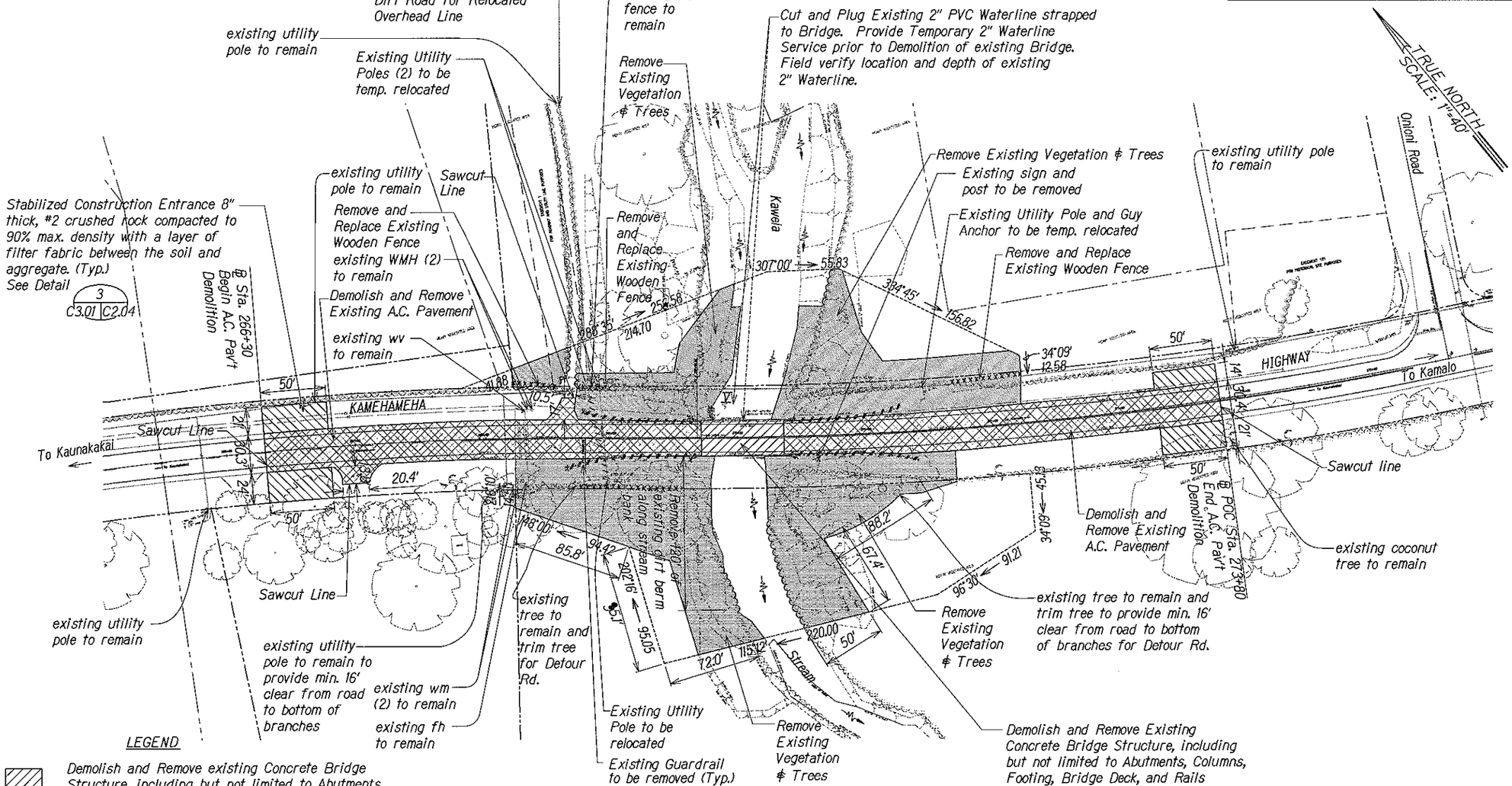
SHEET No. C3.02 OF 86 SHEETS

EXHIBIT "B-5"

EXHIBIT B-6.

Demolition Plan, Sheet No. C3.01

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	19	90



DEMOLITION PLAN

SCALE: 1" = 40'

KENT R. MORIMOTO LICENSED PROFESSIONAL ENGINEER No. 6974-C HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DEMOLITION PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

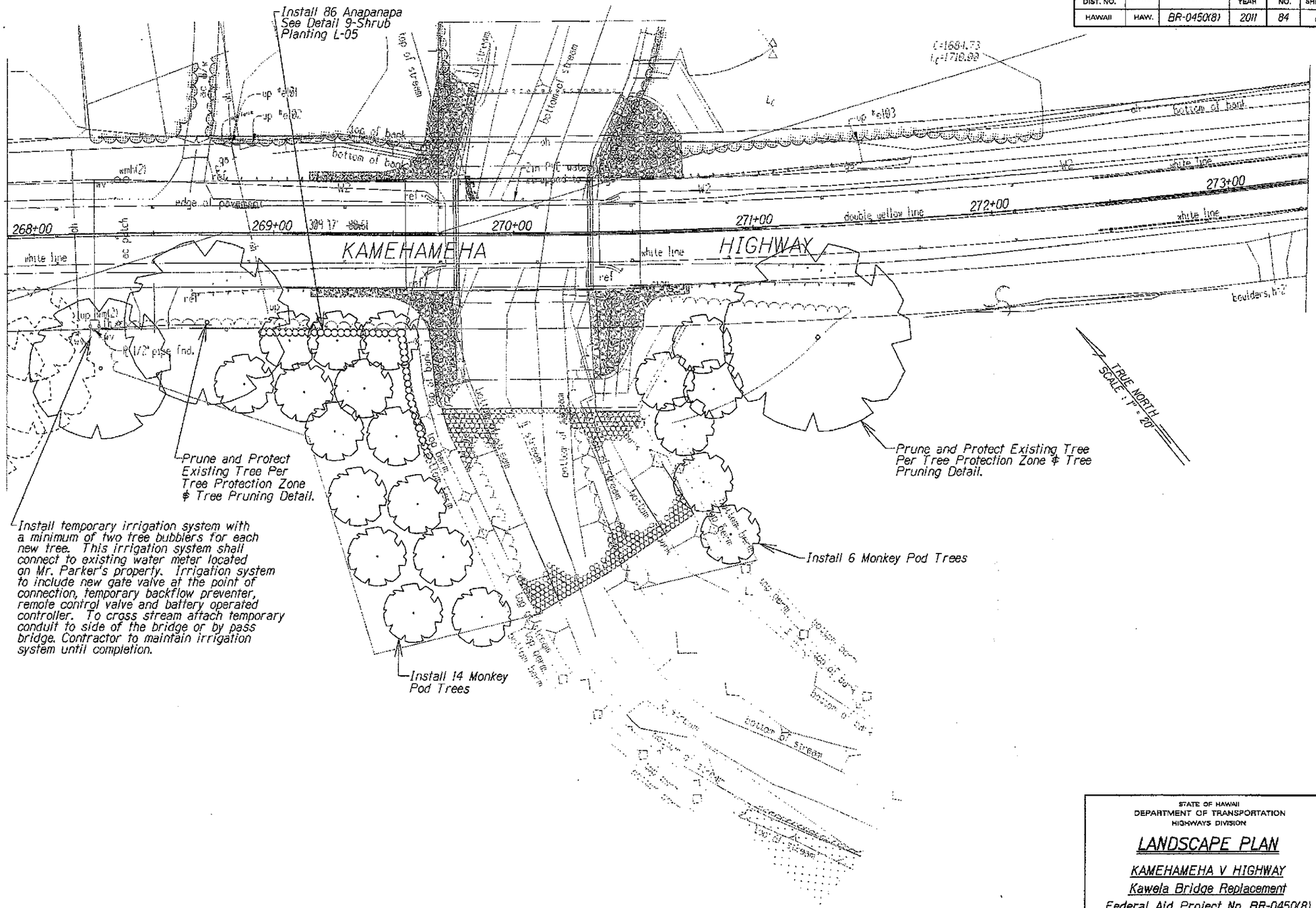
SHEET No. C3.01 OF 86 SHEETS

EXHIBIT "B-6"

EXHIBIT B-7.

Landscape Plan, Sheet Nos. 1, 2, and 3

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	84	86



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LANDSCAPE PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: 1" = 20' Date: June, 2010

SHEET No. 1 OF 3 SHEETS

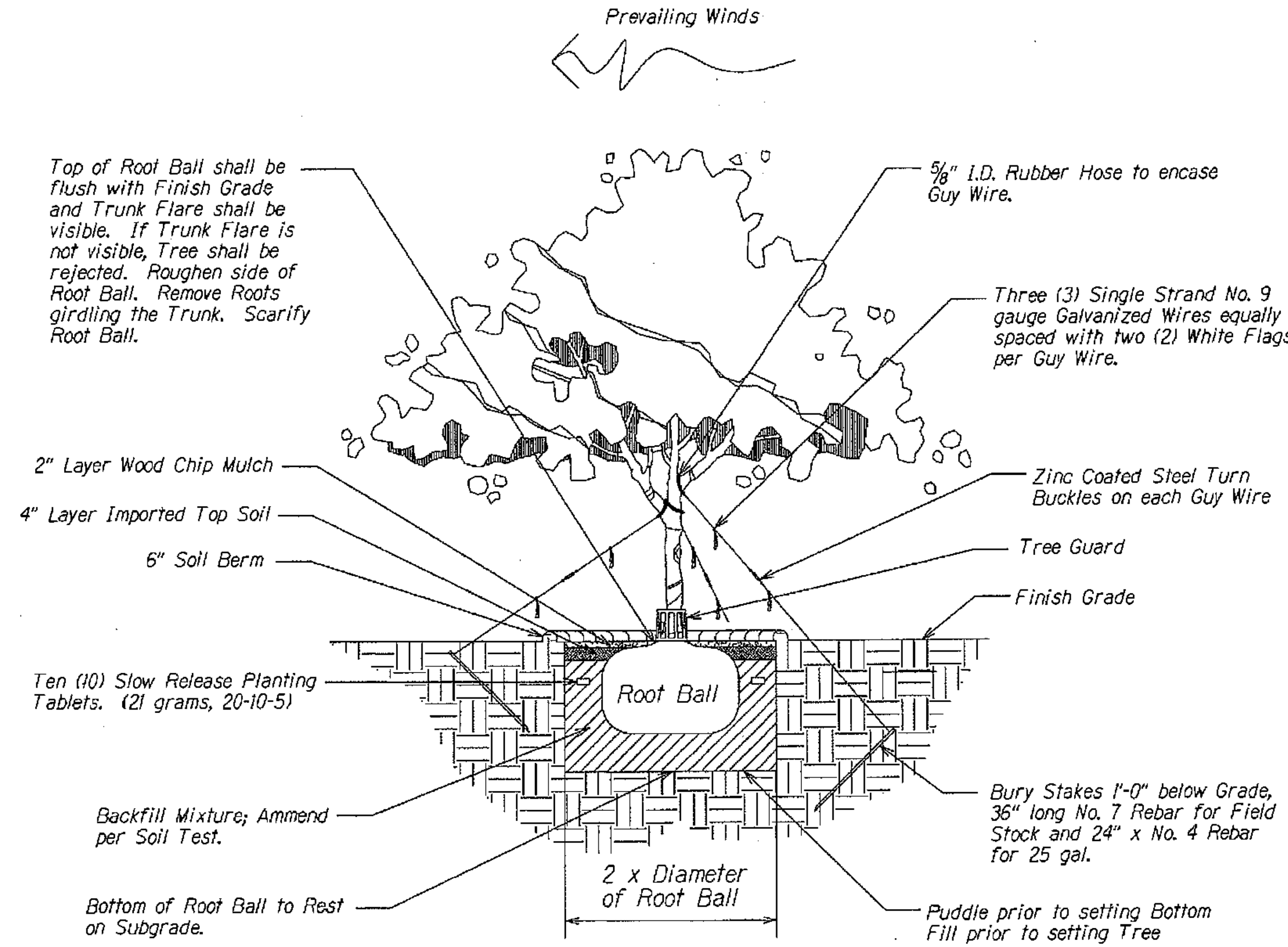
ORIGINAL PLAT | SURVEY PLOTTED BY ____ DATE | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY

EXHIBIT "B-7"

PLANTING NOTES:

1. Landscape Contractor shall field verify all plant quantities and dimensions prior to installation. Quantities shown on plant list are for reference only, verify actual quantities as shown on plan. If there is discrepancy, the planting plan shall take precedence.
2. Landscape Contractor shall be responsible for location and protecting existing utilities.
3. Prior to tree excavation, all planting locations shall be staked out by Contractor for approval by Engineer. Do not plant until ground has been prepared and free of stones greater than ½" diameter, pipes, debris, trash, stumps, shrubs; site is neat, orderly, and the Engineer accepts site for planting. Cleaning and Grubbing shall be considered an incidental expense to section 619 Planting.
4. Notify Engineer of any discrepancies in plant locations or insufficient plant quantities due to difference in plans and actual field conditions.
5. Notify Engineer 30 days prior to planting operations for approval of all plant material at place of growth. All plant material not approved by the Engineer will be subject to rejection.
6. The Engineer will inspect plants at the place of growth and after the delivery to the project. Each tree shall meet the specified size and height prior to planting.
7. Plants shall meet size indicated by minimum height and spread. Plants shall be straight and uniformly shaped, unless unique or special characteristics are specified, and shall be undamaged, sound, healthy, vigorous and free of disease and insect infestation. Plants not conforming to these requirements on delivery to the project and at the end of the plant establishment period will be rejected.
8. Contractor shall be solely responible for the complete removal and damages resulting from planting any plant species listed on the Hawaii Department of Agriculture 'Noxious weed rules' as defined in the statute, Hawaii Administrative Rules 4:68:1 or the 'Federal Noxious Weed List' as defined in Title 7 of the code of Federal Regulations (CFR), parts 360 and 361.
9. All tree work must adhere to American National Standard Institute (or ANSI)-A300 tree care standards and ANSI-Z133 safety standards for tree work. Work shall be contracted to Arborists that has been certified in good standings as an ISA certified Arborist for at least 5 years to assure that tree work is performed properly and trees are not damaged by practices such as topping, flush cuts, over-thinning, or climbing with spikes. Contractor shall submit a copy of the ISA Arborist certification of good standing if 5 years to the Engineer minimum 7 days prior to tree pruning.
10. Guy wires, flagging, stakes, windbreakers, etc. shall be maintained and replaced if necessary by the Contractor until the tree or shrub is able to stand by itself. The Contractor shall remove and dispose at the end of plant establishment period.
11. Any planting that obstructs sight distance, signs or traffic lights shall be relocated or removed as determined by the Engineer.

SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE ∲ NOTES
Mp	20	Samanea Saman	Monkeypod Tree	2-2½" Caliper, 50 Gal. Container
An	58	Colubrina asiatica	Anapanapa	3' O.C. - 3 Gallon Container



TREE PLANTING DETAIL

Not To Scale

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLANTING DETAILS

KAMEHAMEHA V HIGHWAY

Kawela Bridge Replacement

Federal Aid Project No. BR-0450(8)

Not To Scale — Date: June, 2010

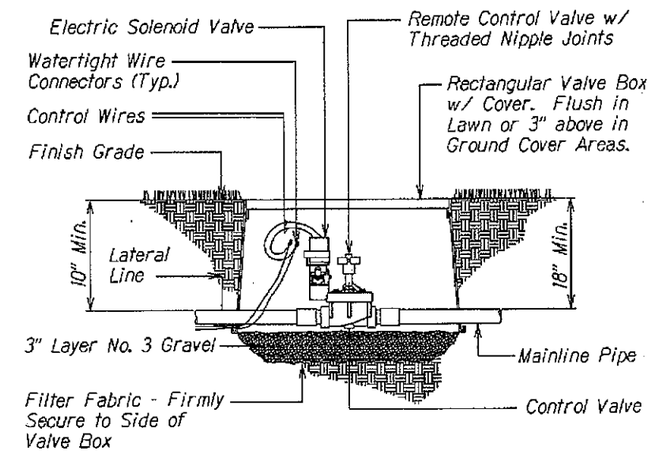
SHEET No. 2 OF 3 SHEETS

EXHIBIT "G-1"

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	86	86

IRRIGATION NOTES:

1. This irrigation system shall connect to water meters located on Mr. Parker's property.
2. Install temporary irrigation system with a minimum of two tree bubblers for each new tree. Irrigation system to include new gate valve at point of connection, temporary backflow preventer, remote control valve, battery operated controller. Contractor to maintain irrigation system until completion.
3. Provide engineer with all documentation, manuals, and appurtenances for the battery operated controller.
4. At completion of project remove the temporary irrigation system and turn over to the engineer the gate valve, temporary backflow preventer, remote control valve, and the battery operated controller.
5. Contractor shall install irrigation lines, wires, valves and heads per specifications. Existing point of connection, etc. are derived from the best available informations and on-site inspection. The Contractor shall verify those points of connection noted and report any discrepancies to the Engineer.
6. This plan is diagrammatic. Irrigation system is subject to field adjustments due to unanticipated site conditions. Locate all mainlines, laterals, valves and sprinklers heads within planting areas, unless otherwise noted. Place mainline in planting areas where no sleeves are shown. Avoid any conflict between underground utilities, structures and plantings. The Contractor shall be responsible for locating and protecting all existing utilities.
7. This irrigation system was designed with a minimum static water pressure of 50 psi at the point of connection. Notify the Project Engineer if water pressure is less than 50 psi or greater than 50 psi.
8. Contractor shall secure all necessary permits and observe all local codes and regulations. The Contractor shall confirm all sites dimensions and conditions, and report any discrepancies to the Engineer.
9. Contractor shall coordinate the insallation of all sleeves, conduits, mainlines and lateral under pavement and through walls. Contractor shall assure that these items are laid prior to placement of pavement or wall structures.
10. Perform hydrostatic test by applying continuous static pressure of 60 psi for one (1) hour. Notify the Engineer at least three (3) days in advance of test. Repair leaks that develop and repeat test. Do not backfill until there is no further sign of leakage.
11. Perform operability test by opening remote control valve and test circuits for leaks around barbed and threaded pvc fittings. Repair leaks and repeat test. Notify the Engineer at least three (3) days in advance of test. Do not backfill until there is no further sign of leakage.
12. Perform coverage test. Before planting period, run automatic controller through all its cycles. Check watering for coverage and uniformity in company of the Engineer. Run system until there are puddles or there is sheet flow to determine initial irrigation time and number of cycles per week needed to water requirements of plants.
13. Locate valve boxes so that the outer edges are no closer than five feet to roadway pavement. Group valve boxes and feasible.



H REMOTE CONTROL VALVE DETAIL N.T.S.

IRRIGATION EQUIPMENT LIST

Symbol	Quantity	Manufacturer Catalog Number	Description	G.P.M.	Radius	P.S.I.
	2	Rainbird 100-PEB-PRS-D w/ Actuator	1" Remote Control Valve w/ Actuator			
	2	Rainbird TBOS-ICMUS controller	1 Station Irr. Cntlr.			
	2	3/4" FEBCO 805Y or B.W.S. Approved Equal	Backflow Preventer			
		PVC Schedule 40	Irrigation Main			
	40	Rainbird 1804-SAM-PRS-8H	4" Pop-up Nozzle Half Circle Tree Bubbler			

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

IRRIGATION DETAILS

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Not To Scale Date: June, 2010

SHEET No. 3 OF 3 SHEETS

EXHIBIT "B-7"

EXHIBIT B-8.

Drainage Calculations

STORM DRAIN CALCULATIONS
KAMEHAMEHA V HIGHWAY

KAWELA BRIDGE REPLACEMENT

MOLOKAI, HAWAII
TMK: (1) 4-1-023: 024, 027

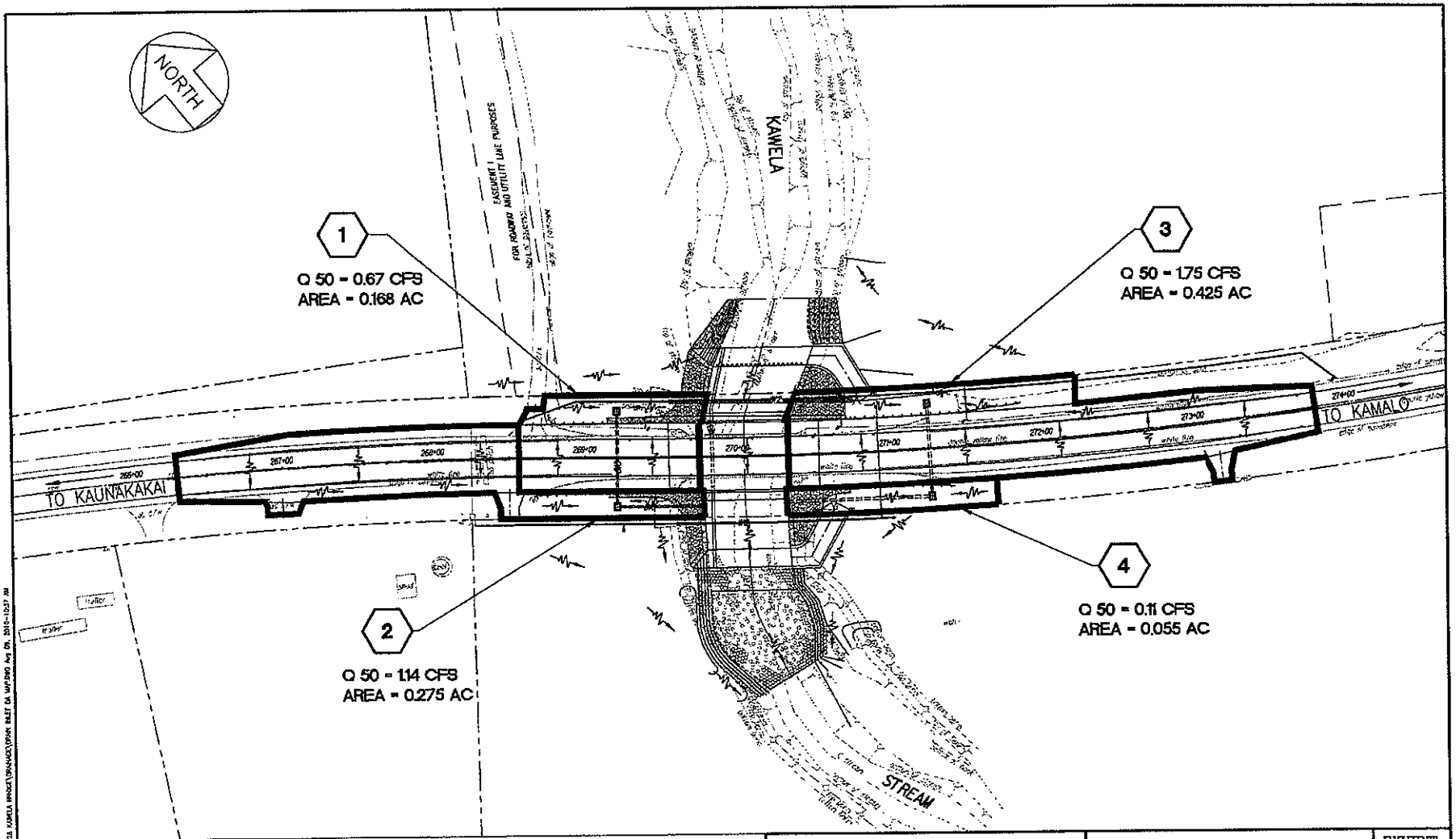
August, 2010

Prepared for:

State of Hawaii
Department of Transportation
601 Kamokila Boulevard, Room 688
Kapolei, HI 96707

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
501 Sumner St, Suite 521
Honolulu, Hawaii 96817
Telephone: (808) 533-3646
Facsimile: (808) 526-1267
E-mail: atahnl@atahawaii.com
Honolulu • Wailuku • Hilo, Hawaii

EXHIBIT "B-8"



SCALE: 1" = 60'

DRAINAGE REPORT

KAWELA BRIDGE REPLACEMENT

KAUNAKAKAI, MOLOKAI, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DRAIN INLET DRAINAGE AREA MAP

EXHIBIT 1

AUGUST 2016

DRAIN INLET RUNOFF CALCULATIONS

Use Rational Method Formula: Q = CIA

Q = Flow rate in cubit feet per second (cfs);
C = Weighted runoff coefficient
I = Rainfall intensity for storm duration equal to the time of concentration in inches per hour (in/hr);
A = Drainage area in acres (ac)

RUNOFF CALCULATIONS

		(A)	(C)			(I)	(Q)
Drainage Area	Discharge To	Drainage Area (ac)	Runoff Coeff.	Time of Conc. (min)	25-Yr., 1-Hr. Rainfall (in)	Adj. Intensity (in/hr)	Flow Rate (cfs)
1	DI-1	0.168	0.83	10.0	2.3	4.8	0.67
2	DI-2	0.275	0.86	10.0	2.3	4.8	1.14
3	DI-3	0.425	0.85	10.0	2.3	4.8	1.75
4	DI-4	0.055	0.43	10.0	2.3	4.8	0.11

Notes:
1. Refer to Weighted Runoff Calculations for "C" value.
2. A minimum Time of Concentration of 10 minutes is assumed.
3. 25-Year recurrence interval is used for design.

DRAIN INLET RUNOFF CALCULATIONS (CONTINUED)

LAND USES OR SURFACE TYPES AT SITE:

Grouted Rip Rap (GRP)	C = 0.95
Pavement	C = 0.95
Unimproved Area	C = 0.30

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS:

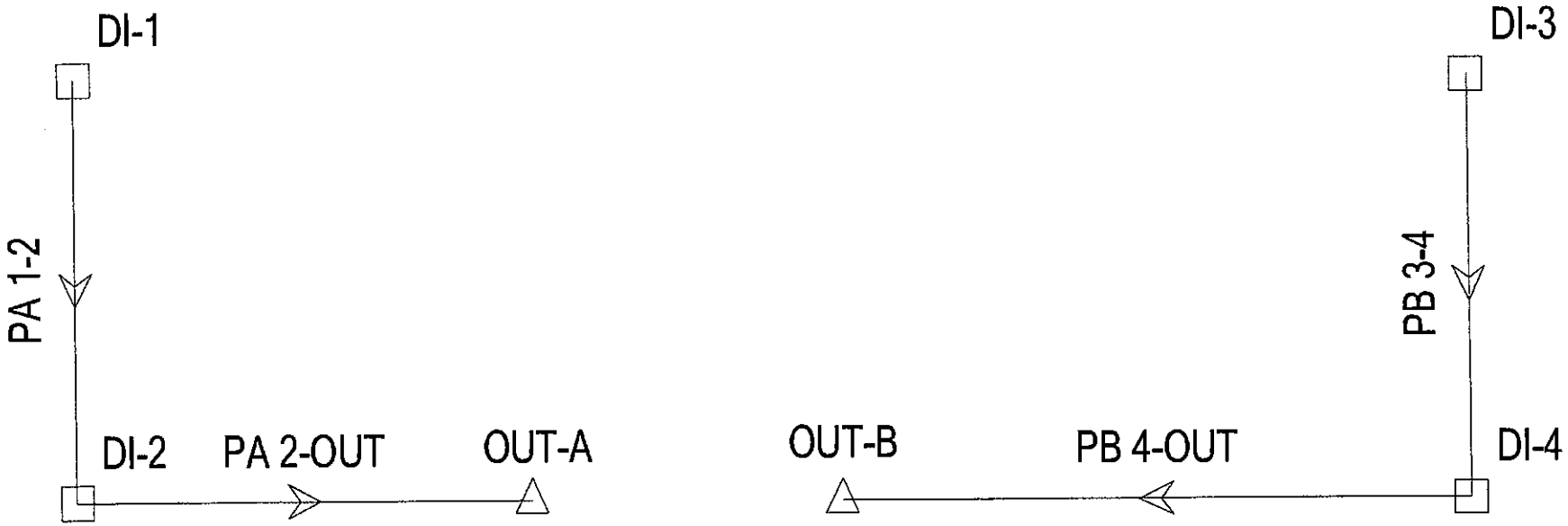
Drainage Area 1		**Percent**	**Area (SF)**	**Area (AC)**
GRP	C = 0.95	7.1%	523	0.012
Pavement	C = 0.95	73.7%	5,399	0.124
Unimproved Area	C = 0.30	19.2%	1,407	0.032
	C = 0.83	100.0%	7,329	**0.168**

Drainage Area 2		**Percent**	**Area (SF)**	**Area (AC)**
GRP	C = 0.95	3.8%	456	0.010
Pavement	C = 0.95	83.0%	9,951	0.228
Unimproved Area	C = 0.30	13.2%	1,580	0.036
	C = 0.86	100.0%	11,987	**0.275**

Drainage Area 3		**Percent**	**Area (SF)**	**Area (AC)**
GRP	C = 0.95	3.5%	649	0.015
Pavement	C = 0.95	81.2%	15,040	0.345
Unimproved Area	C = 0.30	15.3%	2,842	0.065
	C = 0.85	100.0%	18,531	**0.425**

Drainage Area 4		**Percent**	**Area (SF)**	**Area (AC)**
GRP	C = 0.95	20.5%	495	0.011
Pavement	C = 0.95	0.0%	0	0.000
Unimproved Area	C = 0.30	79.5%	1,915	0.044
	C = 0.43	100.0%	2,410	**0.055**

Scenario: Schematic



Scenario: 25-Yr

Inlet Report- Kawela Bridge

Item	Label	Inlet	Inlet Location	Ground Elevation (ft)	Sump Elevation (ft)	Area (acres)	Inlet C	Time of Conc. (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Carryover Rational Flow (cfs)	Total Flow To Inlet (cfs)	Intercepted Rational Flow (cfs)	Bypassed Rational Flow (cfs)	Capture Efficiency (%)
1	DI-1	Generic 61614P Grate Inlet 100%	In Sag	5.50	1.70	0.168	0.83	10.00	4.80	0.67	0.00	0.67	0.67	0.00	100.0
2	DI-2	Generic 61614P Grate Inlet 100%	In Sag	5.80	1.37	0.275	0.86	10.00	4.80	1.14	0.00	1.14	1.14	0.00	100.0
3	DI-3	Generic 61614P Grate Inlet 100%	In Sag	4.70	1.50	0.425	0.85	10.00	4.80	1.75	0.00	1.75	1.75	0.00	100.0
4	DI-4	Generic 61614P Grate Inlet 100%	In Sag	5.50	1.19	0.055	0.43	10.00	4.80	0.11	0.00	0.11	0.11	0.00	100.0

© Bentley Systems, Inc.

Austin Tsutsumi AssociatesHONO
Haestad Methods Solution Center Watertown, CT 06795 USA +1-203-755-1666

Scenario: 25-Yr

HGL Report- Kawela Bridge

Line	Label	Section Size	Material Description	Mannings n	Length (ft)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Slope (%)	Hydraulic Slope (%)	Total System Flow (cfs)	Full Flow Capacity (cfs)	Avg. Velocity (ft/s)	Normal Depth / Diameter (d/D) (%)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Headloss (ft)
1	DI-1									0.67				5.50	2.62	2.62	0.00
2	PA 1-2	18 inch	Concrete	0.012	62.24	1.70	1.37	0.53	0.00	0.67	8.29	2.82	19.3		2.62	2.62	0.00
3	DI-2									1.81				5.80	2.62	2.60	0.02
4	PA 2-OUT	18 inch	Concrete	0.012	56.88	1.37	1.09	0.49	0.02	1.81	7.98	3.65	32.3		2.60	2.59	0.01
5	OUT-A									1.80				7.20	1.09	1.09	0.00
6	DI-3									1.75				4.70	2.28	2.25	0.03
7	PB 3-4	18 inch	Concrete	0.012	60.50	1.50	1.19	0.51	-0.00	1.75	8.15	3.67	31.5		2.25	2.25	-0.00
8	DI-4									1.85				5.50	2.25	2.22	0.03
9	PB 4-OUT	18 inch	Concrete	0.012	97.81	1.19	0.71	0.49	0.01	1.85	7.97	3.67	32.8		2.22	2.21	0.01
10	OUT-B									1.83				7.20	0.71	0.71	0.00

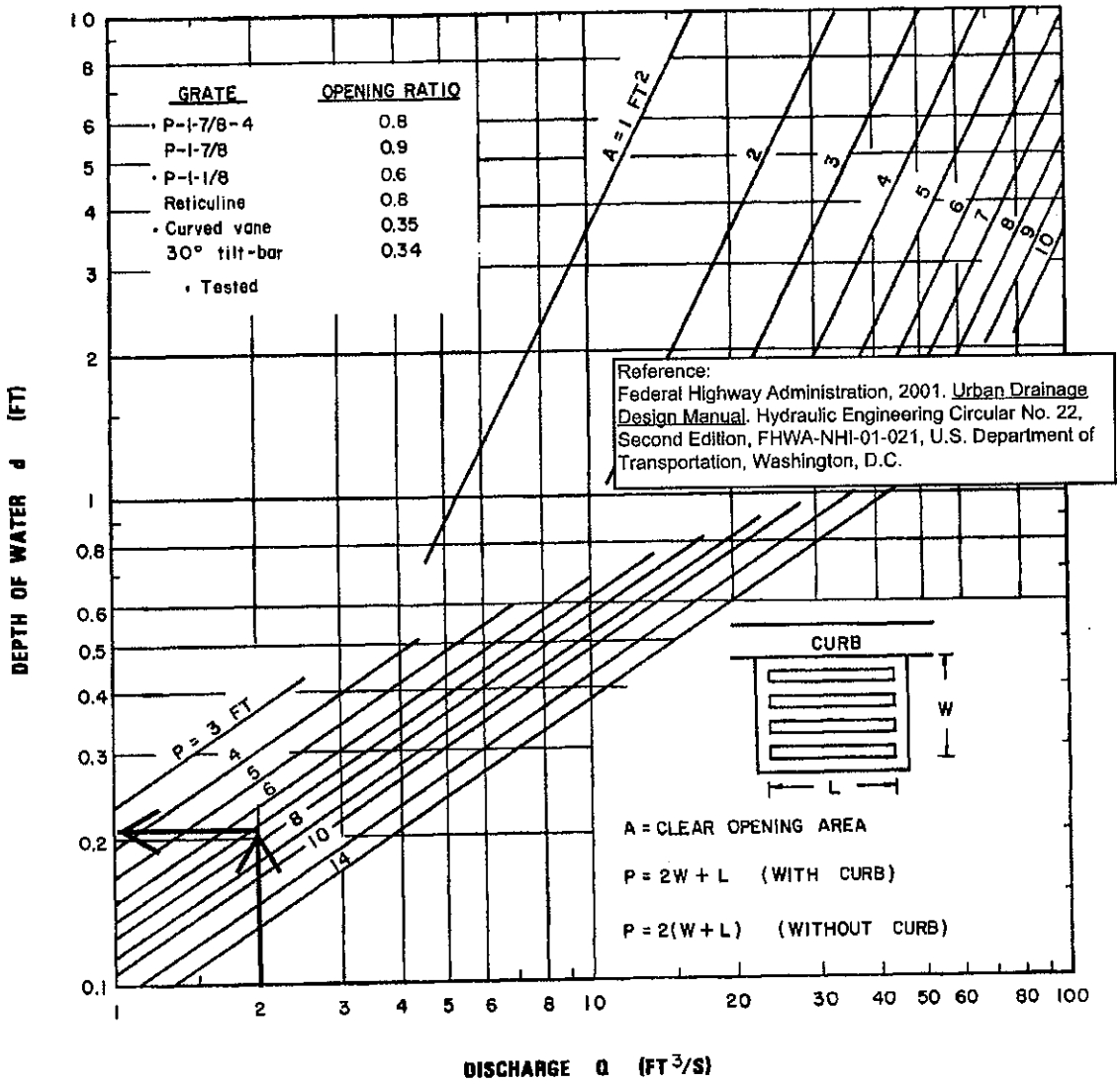
NOTE: Crown of pipe is used as the starting water surface elevation at outlets.

© Bentley Systems, Inc.

Austin Tsutsumi AssociatesHONO
Haestad Methods Solution Center Watertown, CT 06795 USA +1-203-755-1666

GRATE INLET CAPACITY IN SUMP CONDITONS CHART

CHART 9B



Example Sump Conditions Ponding Depth Calculation:

Given: HDOT 61614P Grate (P-1-7/8-4 Equivalent)
Grate Length = 3.3 ft
Grate Width = 2.0 ft (For 1 Side of Double Grate)
Discharge = 4.0 ft^3/s

Find: Perimeter = 7.30 (For 1 Side of Double Grate)
Discharge =2.0 ft^3/s (For 1 Side of Double Grate)
Avg. Depth of Water = 0.21 ft

Note: Since inlet grate is not level, the Avg. Depth is based on the center of the grate opening.

Sump Conditions - English Units

RESULTS FOR KAWELA BRIDGE:

DI #	Q (cfs)	Ponding Depth (ft)
1	0.67	0.07*
2	1.14	0.10*
3	1.75	0.12*
4	0.11	0.03*

*Q is below the chart range. Ponding Depth is extrapolated.

- Ponding Depth will not flood roadway areas.

ATTACHMENT C.

Best Management Practices Plan

ATTACHMENT "C"

BEST MANAGEMENT PRACTICES PLAN

This Best Management Practices (BMPs) Plan was developed for the Kawela Bridge Replacement Project. Best Management practices will be implemented to mitigate potential pollution into the Kawela Stream and the surrounding construction area. Site specific BMP Plans (SSBMPs) will be developed by the contractor, once selected, to provide more detail to mitigate construction methods. The contractor's SSBMPs will supplement the site specific BMPs in this application.

1. Environmental Effects

Temporary environmental effects due to construction of the detour route will occur. A trench will be excavated in the Kawela Stream to facilitate installation of the six (6) 42-inch culverts. Grouted rip-rap will be set over the upstream opening of the culvert and then fill will be placed over the culverts to raise the grade of the detour route. However, this activity is anticipated to have an insignificant effect on the water quality. This activity will disturb the soils and vegetation in the immediate vicinity. The detour road will be constructed in two (2) phases to allow a continuous flow of the stream. Refer to **Attachment "G"**, Sheet C2.03 and Sheet C2.04. Environmental impacts will be mitigated by Best Management Practices Plan for erosion control and will be monitored by contractor and AECOS, Inc. in accordance with the Applicable Monitoring and Assessment Program (AMAP) in **Attachment "E"**. After construction, the area will be landscaped. Refer to Landscape Plan, **Attachment "B"** (Exhibit B-7), Sheet Nos. 1, 2 and 3.

Environmental effects due to the installation of micropiles, the construction of the stream channel lining, concrete abutments, CRM and GRP bank stabilization and rip-rap protection of the concrete lined channel from underscouring and placement of bollards upstream of the improvements will occur. A Construction Phasing Plan and Erosion Control Plan have been prepared for the contractor to work within the stream incrementally to control runoff, sediment, and erosion, during inclement weather. See **Attachment "F"** and **Attachment "G"**, respectively.

2. Discharge Characteristics and Potential Pollutants

The proposed Kawela Bridge Project and actions within Kawela Stream may result in a discharge of pollutants in the project vicinity if care is not taken and BMPs are not employed. The discharge characteristics and potential pollutants are described below.

2.1 Discharge Characteristics

The following discharges may be produced during construction within the Kawela Stream:

1. Materials associated with bridge structural support and streambed lining
2. Discharge associated with storm and construction runoff

The proposed project will install support structures and streambed lining in Kawela Stream. The first type of discharge may come from materials associated with construction excavation and discharge, such as sand or dirt debris swept away by storm runoff. The excavation material will be predominantly clay (Pulehu clay loam). The related discharge material will be construction grade aggregate of crushed basalt or coral, geotextile fabric to line excavated areas, river rock, concrete material and grouted micro piles. Refer to **Attachment "F"**, Construction Phasing Plan.

The second-type of discharge may come from storm and construction runoff. Silt fences will be placed along the stream banks as a barrier between the construction site and the downstream areas to collect silt and other debris from entering the stream. Gravel snakebags will be placed in the immediate area of construction. Work within Kawela Stream will not be performed if there is continuous flow within the stream. Refer to **Attachment "G"**, Erosion Control Plan.

3. Construction and Restoration Plan

The following temporary construction activities and the means to prevent pollution from these activities are discussed. With proper care and the use of BMPs, the impact to the environment by these construction activities will be minimized.

3.1 Construction Control Techniques

1. Clearing and grubbing shall be held to a minimum necessary for grading equipment operation.
2. Erosion and sediment control measures will be in place and functional before earth moving operations begin, and will be maintained throughout the construction period. Temporary measures may be removed at the beginning of the work day, but shall be replaced at the end of the work day.
3. All control measures shall be checked and repaired as necessary, for example, weekly in dry periods and within twenty-four hours after any rainfall of 0.5 inch or greater within a 24-hour period. During prolonged rainfall, daily checking is necessary. Contractor shall maintain records of checks and repairs to structural and vegetative controls.

4. The Contractor shall sequence construction to minimize the exposure time of cleared surface areas. However, any changes to the construction phasing as set out in the phasing plans (**Attachment "F"**) will require the approval of DOH, CWB before proceeding. Areas of one (1) phase shall be stabilized before another phase can be initiated. Stabilization shall be accompanied by protecting the disturbed soils surface from rainfall impacts and runoff by use of structural controls, such as geotextile filter fabric, berms, or sediment basins, or vegetative controls, such as grass seedlings or hydromulch.
5. Maintenance and fueling of construction equipment and vehicles shall be performed only in designated area(s) protected by a containment to contain potential spillage of fuel or lubricants.

3.2 Construction Control Measures

For the application locations and proposed BMPs, please see **Attachment "F"** and **Attachment "G"**.

Silt fences will be installed along bottom of the stream embankments. A portion of the Kawela Streambed will have a temporary berm made of impermeable bags filled with native, in-stream, non-sediment material. Approximately half of the stream channel will always remain open. The fences will capture silt and sedimentation from storm and construction runoff. The silt fences will be monitored visually by the contractor on a regular basis and emptied/cleaned as needed. A typical silt fence installation is shown in **Attachment "G"**. At the immediate vicinity of the streambed slab installation, gravel snake bags from Geotech solutions will be used to facilitate equipment movement.

Construction waste, excavated trench materials or cleared vegetation will be temporarily placed within the staging area and will be transported off-site on a daily basis. Excavated areas will be covered in the event of rainfall, and a filter fence will be installed around the perimeter of the area to contain stormwater runoff. Trash or vegetation will be removed from the construction vicinity and stored in a container on a daily basis.

All equipment that needs to be refueled will be refueled at least 20 feet away from the stream. In addition, the Contractor is required to follow HDOT's Construction Best Management Practices Field Manual dated January 2008 as stated on Note #2 of the Water Pollution and Erosion Control Notes on the Construction Plans. BMP SM-13 for Vehicle and Equipment Refueling is attached hereto as **Attachment "1"** for quick reference. The construction area will be regularly monitored visually by the onsite construction supervisor for petroleum and oil products. If petroleum is observed, construction will immediately stop until it is completely cleaned and the source is identified.

In the event of a heavy storm or there is continuous flow in the stream, construction within the stream will be delayed to prevent construction and storm runoff from entering the stream. All BMPs will be monitored daily by the contractor.

3.3 Vegetative Controls

1. Existing ground cover will not be destroyed, removed, or disturbed more than 20 calendar days prior to start of grading operation.
2. Temporary soil stabilization with appropriate vegetation shall be applied on areas that remain unfinished for more than thirty (30) calendar days, and permanent soil stabilization using vegetative controls shall be applied as soon as practicable after final grading.
3. Temporary soil stabilization shall not be removed until permanent soil stabilization with perennial vegetation application is practical.

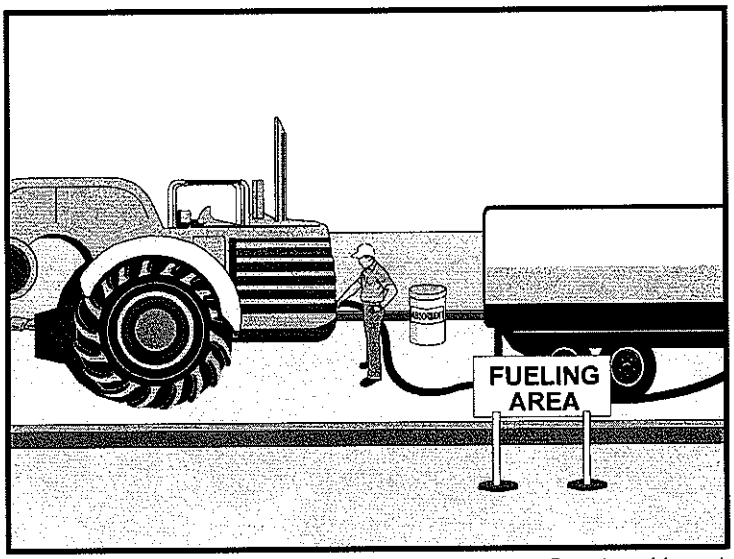
3.4 Site Restoration

After the completion of in-stream work, all BMP control measures will be removed. The disturbed areas will be visually inspected to ensure that the soils have sufficient stability for the silt fences to be removed. Care will be taken when the measures are taken down to prevent sedimentation from entering the stream. Removal of control measures will not be done under inclement weather (wind, rain). If it is determined that the soils are unstable, the silt fences will be removed only after vegetation begins to grow to provide soil stability.

The construction site will be restored by site landscaping. Exposed areas will be hydromulched to induce vegetative cover and landscaped. Refer to Erosion Control Plan and Landscape Plan. The water quality will be monitored during and after construction by AECOS, Inc. to ensure construction does not impact the water quality adversely.

Vehicle and Equipment Refueling

SM-13



Source: Caltrans Construction Site Best Management Practices Manual, 2003.

Description

Practices and procedures to prevent or reduce the discharge of pollutants to storm water from vehicle and equipment fuel leaks or spills.

Applications

Construction or maintenance activities involving fueling of vehicles or equipment.

Installation and Implementation Requirements

- Comply with Federal and State requirements regarding stationary, above ground storage tanks.
- Use off-site fueling sites when practical. Off-site fueling sites may be better equipped to service and handle spills due to multiple vehicles or pieces of equipment.
- If on-site fueling is necessary, locate designated fuel areas away from drainage courses to prevent contamination of storm water.
- Avoid "topping-off" of fuel tanks.
- Drip pans or drop cloths shall be used to absorb leaks or spills during fueling.
- Absorbent spill cleanup materials shall be available and located in fueling areas.
- Use absorbent materials on small spills instead of hosing down or burying the spill. Promptly remove and properly dispose the absorbent materials.
- Minimize mobile fueling of construction equipment by transporting equipment to designated areas for fueling.
- Train employees on proper fueling and cleanup procedures.

Vehicle and Equipment Refueling

SM-13

Limitations

Off-site fueling of vehicles and equipment may not be practical.

Inspections and Maintenance

- Ample supplies of materials for fuel spill control and cleanup shall be located on-site near fueling areas.
- Regularly inspect fueling areas and storage tanks.

ATTACHMENT D.

Water Quality and Biological Surveys of Kawela Stream, Molokai, Hawaii

Water quality and biological surveys of Kawela Stream, Kawela, Moloka'i, Hawai'i[1]

July 24, 2010 *AECOS* No. 1124

Susan Burr
AECOS, Inc.
45-939 Kamehameha Highway, Room 104
Kaneohe, Hawai'i 96744
Phone: (808) 234-7770 Fax: (808) 234-7775 Email: aecos@aecos.com

Introduction

On June 30, 2006, two *AECOS* biologists conducted a reconnaissance survey of Kawela Stream on the southern coast of East Moloka'i. (Figure 1). The purpose of the survey was to ascertain biological resources and assess water quality around the Kamehameha V Highway bridge, which is proposed for replacement. We documented the aquatic fauna found within the proposed project area and looked for sensitive native aquatic species and federally-listed species in the stream. This report presents findings of the survey

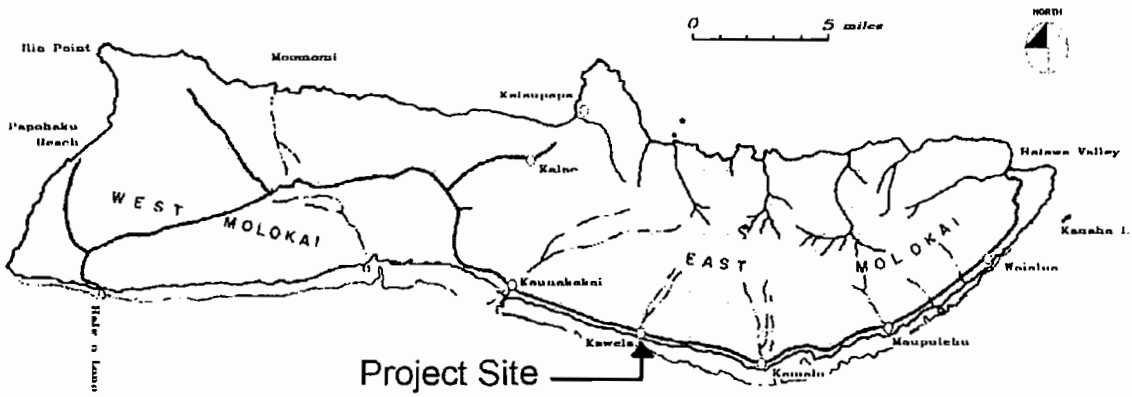


Figure 1. Project location on the Island of Moloka'i.

[1] This report was prepared for use by Kai Hawaii in an environmental assessment of the project. As such, it will become part of the public record for a government project.

General Site Description

The southern coast of Moloka'i has a characteristically dry climate and most streams are either perennial and interrupted at the coast, or are intermittent. Kawela Stream (State Perennial Stream ID No. 4-2-15) is a multi-branched, interrupted stream that extends from the Moloka'i Forest Reserve to the ocean near the town of Kawela (Figure 2). Only the upper reaches of the West and East Forks are perennial; much of the stream course is dry throughout the year. A *muliwai* (coastal estuarine pond) extends from the behind the ocean shore to the vicinity of the highway bridge.

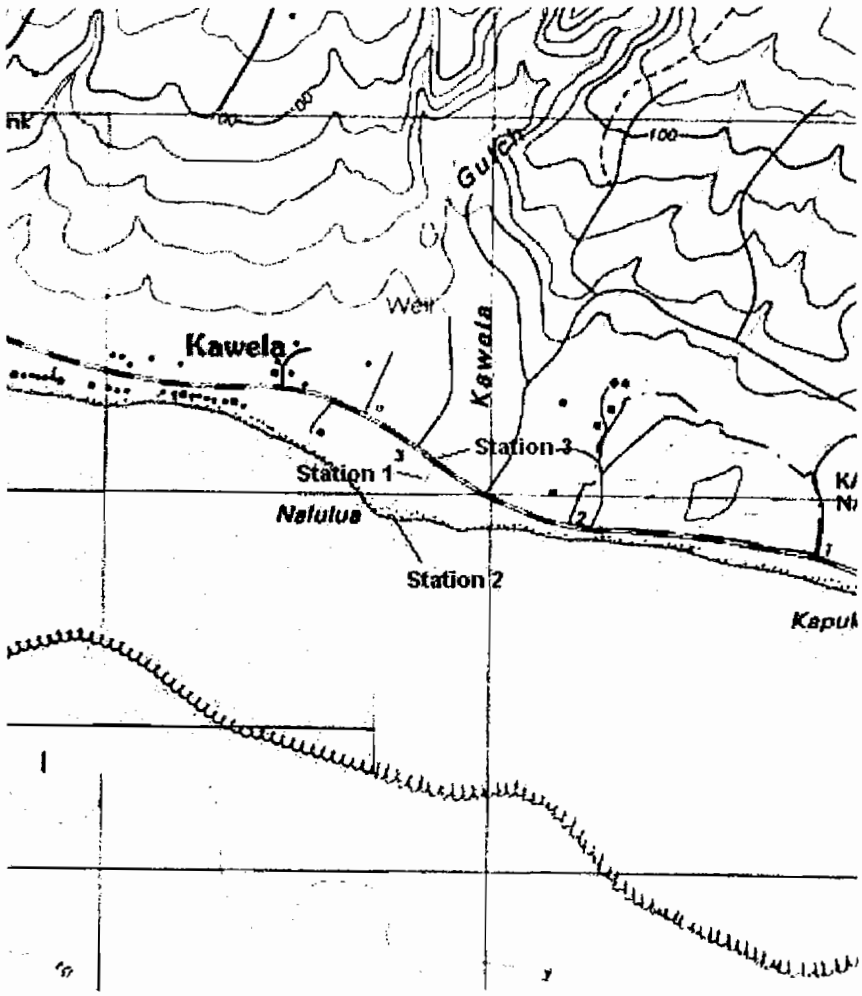


Figure 2. The project site where Kamehameha V Highway crosses Kawela Stream with water quality sampling locations indicated on map.

Kawela Stream arises (on the highest branch) above 365 m (1200 ft) along the crest of the East Molokai volcano. The two forks of the stream are deeply incised throughout until the coastal plain, not far upstream from the bridge, at which point the stream bed widens and is hardly at all incised (less than 2 m). Upstream from the bridge, the stream bed consists of fine sediments and rounded boulders, the banks are lined with monkeypod (*Samanea saman*) and Java plum (*Syzgium cumini*) trees, and the dry stream bed is vegetated with various ruderal (weedy) herbaceous plants (Figure 3).

Figure 3. The dry stream bed upstream from Kamehameha V Highway Bridge.

At the time of our survey there was a large isolated pool directly beneath the highway bridge (see Figure 5c). Our *in situ* water quality measurements of this pool indicate that the water is brackish and is maintained by groundwater seepage. Just downstream from the bridge, the banks are fairly steep and appear to have been augmented by the deposition of fill, possibly material dredged from the stream bed near the bridge.

The *muliwai* extends from about 30 m (100 ft) *makai* of the highway bridge to the ocean shore (see Figure 5a). Approximately 60 m (197 ft) downstream from the bridge there is a small dry channel entering the right (west) bank of the *muliwai*. The *muliwai* has a sediment bottom and is bordered by a wide floodplain in both directions. The mouth of the *muliwai* is blocked by a wide beach berm (Figure 4).

Figure 4. The mouth of the Kawela Stream *muliwai* blocked by a wide beach berm.

Java plum and monkey pod trees and various ruderal herbaceous plants are present on the banks and in the stream bed near the highway crossing. Mangroves (*Rhizophora mangle*) are the dominant vegetation downstream towards the mouth of the estuary. Pickleweed (*Batis maritima*) and kiawe (*Prosopis pallida*) dominate the floodplain near the beach. Other conspicuous plants present in the project area include Indian fleabane (*Pluchea indica*), lion's ear (*Leonotis nepetifolia*), sourbush (*Pluchea carolinensis*), *koa haole* (*Leucaena leucocephala*), and tree tobacco (*Nicotiana glauca*). The vegetation present near the highway are all introduced (non-native) species able to recover from periodic disturbance of the soil.

The introduced red mangrove (*Rhizophora mangle*) dominates much of the southwestern shoreline of Moloka'i. Offshore from the mangroves, the nearshore area around Kawela consists almost entirely of sandy reef flats. The coral reef off Kawela is part of a large fringing reef system that extends along the entire south coast of Moloka'i. This reef is very broad and shallow, with depths of only about 0.5 m (1.6 ft) across much of its expanse (*AECOS*, 1995).

A US Geological Survey (USGS) gage station (No. 16415600) is located on Kawela Stream at the 12 m (40 ft) elevation (USGS, 2006). The annual mean stream flow recorded in 2005 for this station is 3.08 cfs and a peak stream flow of 3,190 cfs was recorded in 2002. The stream rarely has any flow at this station during the dry season months.

Water Quality

On June 30, 2006, *AECOS* biologists collected water samples from two locations and measured certain field parameters at one additional location in Kawela Stream (see Figure 2). Station 1 was located in the *muliwai* approximately 30 m (98 ft) downstream from the highway (Figure 5a), Station 2 was located at the mouth of the *muliwai* (Figure 5b); and Station 3 was in an isolated pool of water beneath the highway bridge (Figure 5c). Some parameters were measured by field meter and others in water samples collected in appropriate containers and taken to the *AECOS* Laboratory in Kane'ohe, O'ahu the same day (*AECOS* Laboratory Log No. 21905). Table 1 lists field instruments and analytical methods used with these samples.

Table 1. Analytical methods and instruments used June 30, 2006 for water quality sampling of Kawela Stream, Moloka'i.

Analysis	Method	Reference	Instrument
Ammonia nitrogen	alkaline phenol	Karloeff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Chlorophyll-α	10200 H	Standard Methods 18th Edition (1992)	Turner Model 112 fluorometer
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 550A DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
pH	EPA 150.1	EPA (1979)	Hannah pocket pH meter
Salinity	refractive index	---	handheld temperature compensating refractometer
Temperature	thermister calibrated to NBS cert. thermometer (EPA 170.1)	EPA (1979)	YSI Model 550A DO meter
Total Nitrogen	persulfate digestion/EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion/EPA 365.1	Koroleff in Grasshoff et al. (1986)/EPA 1993)	Technicon AutoAnalyzer II
Total Suspended Solids	Method 2540D (EPA 160.2)	Standard Methods 18th Edition (1992); EPA(1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100N Turbidimeter

D'Elia, C.F., P.A. Stendler, & N. Corwin. 1977. *Limnol. Oceanogr.* 22(4): 760-764.
EPA. 1979. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency, EPA 600/4-79-020.
EPA. 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. EPA 600/R-93/100.
EPA. 1994. Methods for Determination of Metals in Environmental Samples, Supplement 1. EPA/600/R-94/111. May 1994.
Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.
Standard Methods. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.

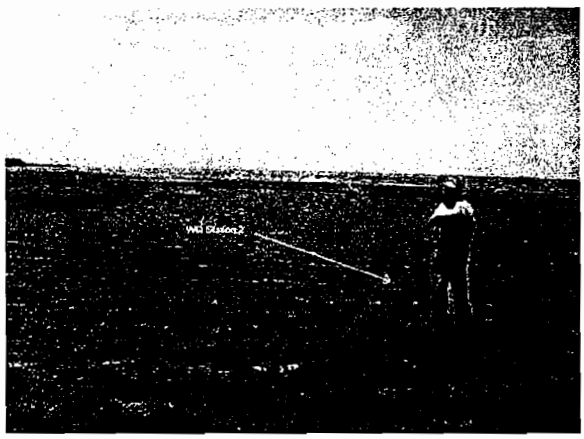


Figure 5a. (upper). Station 1 approximately 30 m downstream from the highway crossing. Figure 5b (middle). Station 2 at the mouth of the *muliwai*. Figure 5c. (lower). Station 3 in isolated pool underneath the highway bridge.

The primary purpose of these water quality measurements was to characterize the existing aquatic environment, not to set baseline values or determine compliance with Hawaii's Water Quality Standards. In fact, the State criteria for all nutrient measurements, turbidity, and chlorophyll α are based upon geometric mean values and a minimum of three separate samples per sampling location would be needed to compute a geometric mean (HDOH, 2004a). Nonetheless, our results can be evaluated against the water quality criteria for estuaries (Table 2) as long as limitations regarding a possible lack of representativeness are realized.

Table 2. State of Hawaii water quality criteria for estuaries (geometric mean values in the table) (HAR §11-54-05.2(d)(1)).

Total Nitrogen (µg N/l)	**Ammonia Nitrogen** (µg NH_4-N/l)	**Nitrate + Nitrite Nitrogen** (µg [NO_3+NO_2]-N/l)	**Total Phosphorus** (µg P/l)	**Chlorophyll-α** (mg/l)	**Turbidity** NTU
200.00	6.00	8.00	25.00	2.00	1.5

- pH - not vary more than 0.5 units from ambient and not be lower than 7.0 nor higher than 8.6.
- Dissolved oxygen - not less than 75% saturation.
- Temperature - not vary more than 1 °C from ambient.
- Salinity - not vary more than 10% from ambient

For the June 30, 2006 sampling event, the predicted high tide of 0.8 feet (lower high water, LHW) was at 07:41 am; the predicted morning low tide of 0.5 feet (higher low water or HLW) was at 11:58 am; and the predicted evening high tide of 2.0 feet (higher high water, HHW) was at 7:21 pm (NOAA/NOS, 2006). According to these tidal predictions, the morning sampling event represented a low tide.

The water quality data collected from the Kawela Stream *muliwai* on June 30, 2006 show marine water with fairly high total nitrogen and total phosphorus levels (Table 3). Most of the water quality parameters tested for will vary depending upon the time of day the samples are collected and the stage of the tide. Temperature, dissolved oxygen, and chlorophyll-α levels will show the greatest diurnal variation, whereas salinity, turbidity, and TSS will likely show the greatest tidal variation.

The temperature of the *muliwai* was relatively high, about 2 C° higher at the *mauka* end than the *makai* end, but 2 C° lower at the isolated pool than the *makai* end of the *muliwai*. The salinity measurements demonstrate that the *muliwai* had little, if any, freshwater influence at the time of sampling. However, the salinity of the isolated pool under the bridge was 10 ppt, demonstrating a significant fresh groundwater influence. The *muliwai* was supersaturated with dissolved oxygen (DO), but the percent saturation of DO was low in the isolated pool, a reflection of

stagnant conditions. Throughout the area, the pH range (7.34 - 8.13) was normal for estuaries.

Table 3. Water quality characteristics of the *muliwai* of Kawela Stream on June 30, 2006.

	Time	Temp. (°C)	Salinity (ppt)	DO (mg/l)	DO % sat	pH (pH units)	Turbidity (ntu)
Station 1	1140	29.3	35	10.56	168	8.05	24.2
Station 2	1155	26.9	35	7.68	124	8.13	47.4
Station 3 (isolated pool)	1125	25.2	10	4.41	57	7.34	--

	Time	TSS (mg/l)	Ammonia (µg N/l)	Nitrate + nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)	Chl. α (µg/l)
Station 1	1140	34	21	1	885	172	22.9
Station 2	1155	58.0	<1	1	593	244	15.6

Turbidity and TSS levels were high in the *muliwai*, but much lower than they would likely be during a period of terrestrial runoff from storm conditions (freshet flow). The high ammonia level measured at Station 1 is an indication of stagnant conditions at the *mauka* end of the *muliwai*. Nitrate + nitrite levels were low throughout, indicating that the remaining nitrogen in the total nitrogen measurements (593 - 885 µg/l) is organic nitrogen. The concentrations of total phosphorus and chlorophyll α were high throughout the *muliwai*. Thus, the high DO value here is the result of DO production by phytoplankton in the *muliwai*.

Aquatic Biota

During the June 30, 2006 survey, we observed both native and introduced aquatic animals in the *muliwai* and the isolated pool under the bridge, but no federally listed species (Federal Register, 1999a, b, 2001). Three species of native aquatic animals (the fishes *'o'opu naniha* or *Stenogobius hawaiiensis*, *'o'opu akupa* or *Eleotris sandvicensis*, and *'o'opu nakea* or *Awaous guamensis*, and the native prawn *'opae 'oeha'a* or *Macrobrachium grandimanus*) were observed. These fishes and prawn are anadromous, meaning that they migrate to and from the ocean but remain in the estuary or stream as adults. *Aholehole* (*Kuhlia xenura)* and schools of *'ama'ama* (*Mugil cephalus*) were abundant. *Aholehole* and *'ama'ama* reside in the estuary as juveniles and migrate into the ocean as they grow. Three species of introduced poecellids are common: Mexican molly (*Poecilia mexicana*) and mosquito fish (*Gambusia affins*) in the estuary, and rainbow fish or guppy (*Poecilia reticulata*) along with the molly in the pool beneath the bridge. The introduced Pacific prawn (*Macrobrachium lar*), also an amphidromous species, was observed in the isolated

pool. Table 4 is a listing with abundance categories given for the animals observed in Kawela Stream.

Table 4. Checklist of aquatic biota observed in Kawela Stream from observations made on June 30, 2006.

Species	Common name	Status	QC Code	Abundance	Location
	INVERTEBRATES				
ARTHROPODA, CRUSTACEA	(crustaceans)				
PALIEMONIDAE					
Macrobrachium grandimanus	*'opae 'oeha'a*	**End**	10	C	*muliwai*
Macrobrachium lar	Pacific prawn	Nat	10	O	pool
Palaemon debilis	grass shrimp	Nat	10	C	*muliwai*
ARTHROPODA, INSECTA	(insects)				
DIPTERA, EPHYDRIDAE	flies, gnats				
indet. species		?	10	C	*muliwai*
ODONATA, LIBULELLIDAE					
Orthemis ferruginea	dragonfly	Nat	10	U	*muliwai*
Pantala flavescens	globe skimmer	**Ind**	10	U	*muliwai*
	VERTEBRATES				
VERTEBRATA, PISCES	(fishes)				
ELEOTRIDAE					
Eleotris sandvicensis	*'o'opu akupa*	**End**	10	O	pool
GOBIIDAE					
Awaous guamensis	*'o'opu nakea*	**Ind**	10	C	pool
Stenogobius hawaiiensis	*'o'opu naniha*	**End**	10	A	*muliwai* & pool
KUHLIIDAE					
Kuhlia xenura	*aholehole*	**End**	10	A	*muliwai* & pool
MUGILIDAE					
Mugil cephalus	mullet, *'ama'ama*	**Ind**	10	A	*muliwai*
POECILIIDAE					
Poecilia mexicana	Mexican molly	Nat	10	C	*muliwai* & pool
Poecilia reticulata	rainbow guppy	Nat	10	C	pool
Gambusia affins	mosquito fish	Nat	10	O	*muliwai*
VERTEBRATEA, AVES					
Nycticorax nycticorax hoactili	black-crowned night-heron, *'auku'u*	**Ind**	10	R	Bridge

KEY TO SYMBOLS USED IN TABLE 4:

Status:

Nat - naturalized. An introduced or exotic species.
Ind - indigenous. A native species also found elsewhere in the Pacific.
End - endemic - A native species found only in the Hawaiian Islands.

QC Code:

10 - Observed in the field by aquatic biologist on June 30, 2006.

Abundance categories:

U - Uncommon - several to a dozen individuals observed.
O - Occasional - regularly encountered, but in small numbers.
C - Common - Seen everywhere, although generally not in large numbers.
A - Abundant - found in large numbers and widely distributed.

Location:

muliwai - estuary downstream of the bridge.
pool - isolated pool beneath the bridge.

The black-crowned night heron or *'auku'u* (*Nycticorax nycticorax hoactli*) was seen flying above the *muliwai* of Kawela Stream. The Department of Land and Natural Resources Division of Forestry and Wildlife lists the *'auku'u* as an indigenous bird of Hawai'i and is therefore protected from hunting, capture, or export under Hawai'i Administrative Rules Chapter 13-124. None of the observed species is listed as threatened or endangered, or otherwise would be considered rare or special by the State or Federal governments (DLNR, 1998; Federal Register, 2005; USFWS, 2005, 2006).

Project Assessments

The South Molokai Coast is listed as an impaired water body by the State, which means that the water body does not meet the Hawaii water quality standards. The geographic scope of listing is the nearshore waters from the shoreline out 5.5 m (18 ft), from the southwest point on Moloka'i to Waialua. The South Molokai Coast is listed on the Hawaii Department of Health, 2006 list of impaired waters in Hawaii, prepared under Clean Water Act §303(d) (HDOH, 2004b). The pollutants for which this area is listed are nutrients, turbidity, and suspended solids. As a result of this impaired listing, a study will be conducted to determine the total maximum daily load (TMDL) of pollutants that the nearshore waters of South Molokai Coast can accommodate without violating Hawaii's Water Quality Standards. Also, the Hawaii Department of Health (HDOH) may require more water quality testing than usual for the Section 401 Water Quality Certification monitoring that will be required for the replacement of the bridge across Kawela Stream.

The water quality of the *muliwai* of Kawela Stream is presently eutrophic but if proper best management practices (BMPs) are employed, the bridge replacement project will not have a significant effect on the quality of the water in the *muliwai* or off the shore. Best Management Practices (BMPs) to prevent sedimentation should be used during the construction phase, and construction should avoid, if possible, periods when high stream flow is likely. Silt curtains should be deployed to prevent movement of soils from off exposed banks and work areas during construction into the stream bed.

The design of both the new bridge and the temporary detour road should take into consideration the needs of migrating native aquatic animals. The scope of work for the project specifies that the design for the detour will include the use of pipe culverts due to its cost efficiency. The culverts should be placed flush with the stream bed to allow passage by migrating (amphidromous) fishes. Most important is that the ends of the culverts (especially the downstream ends) not hang out over the stream bed. Migrating native fauna will climb up wetted surfaces of escarpments, but cannot climb out to reach the lip of a hanging culvert.

The protected *'auku'u* is present the project area and their use of the area must be considered in devising BMPs for the construction phase of the project. This means only that the birds may not be harmed during the construction project. In general, this bird will avoid all on-going human activities at the construction site.

No wetlands were observed in the project area.

If the recommended BMPs are followed, this project is not anticipated to have any adverse impact on the water quality, flora, and fauna of Kawela Stream, the stream estuary (*muliwai*), and the nearshore reef flat.

References Cited

AECOS, Inc. 1995. Water quality and biological assessments for the Kalama'ula Drainage Improvement Project, Moloka'i, Hawaii. Prep. for R.M. Towill, Inc. *AECOS*, Inc. Kailua. *AECOS* No. 822: 21 pp.

Federal Register. 2005. Department of the Interior, Fish and Wildlife Service, 50 CFR 17.Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petition; Annual Description of Progress on Listing Actions. *Federal Register*, 70 No. 90 (Wednesday, May 11, 2005): 24870-24934.

Hawaii Cooperative Park Service Unit. 1990. Hawaii stream assessment. A preliminary appraisal of Hawaii's stream resources. Prep. for State of Hawaii, Commission on Water Resource Management. National Park Service, Hawaii Cooperative Park Service Unit, Rept. No. **R84**: 294 pp.

Hawaii Department of Health (HDOH). 2009. Hawaii Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards. 90 pp.

_____.2008. 2006 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and The U.S. Congress Pursuant To Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117). 279 pp.

Hawaii Department of Land and Natural Resources (DLNR). 1998. Indigenous Wildlife, Endangered And Threatened Wildlife And Plants, And Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.

National Oceanic and Atmospheric Administration (NOAA) and National Ocean Service (NOS). 2006. Water level tidal predictions for Hawaiian Islands in 2006. URL: http://co-ops.nos.noaa.gov/tides05/tab2wc3.html#167.

U.S. Fish & Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 (Tuesday, November 1, 2005).

_____. 2006. USFWS Threatened and Endangered Species System (TESS). URL: http://ecos.fws.gov/tess_public/StartTESS.do

U.S. Geological Survey (USGS). 2006. NWISWeb data for Hawaii web site. Annual statistics for USGS 16415600 Kawela Stream. URL: http://waterdata.usgs.gov/nwis/annual/.

ATTACHMENT E.

Applicable Monitoring and Assessment Program for Clean Water Act (CWA) Section 401 Water Quality Certification, Kawela Bridge Replacement, Kawela, Molokai, Hawaii

Applicable Monitoring and Assessment Program for Clean Water Act (CWA) Section 401 Water Quality Certification, Kawela Stream Bridge Replacement, Kawela, Moloka'i, Hawai'i

October 7, 2010 *AECOS* No. 1124B

Susan Burr
AECOS, Inc.
45-939 Kamehameha Highway, Suite 104
Kāne'ohe, Hawai'i 96744
Phone: (808) 234-7770 Email: sueburr@aecos.com

Introduction

This applicable monitoring and assessment program (AMAP) accompanies the Section 401 Water Quality Certification (WQC) application for the replacement of Kawela Bridge, which crosses Kawela Stream on the southern coast of Moloka'i (Fig 1).

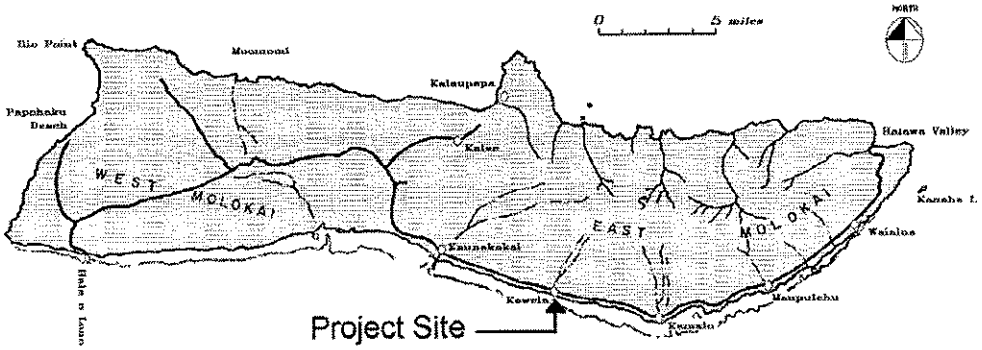


Figure 1. Project location on the Island of Moloka'i.

This AMAP describes the monitoring requirements and the data quality objectives to be met during water quality monitoring efforts for the WQC. The intent of the AMAP is to conduct water quality sampling and analysis to monitor potential impacts caused by in-stream work. The AMAP includes baseline (preconstruction), during-construction, and post-construction monitoring. Data collected as part of the AMAP will be used to assess the adequacy of best management practices (BMPs) applied during construction and will facilitate assessing the impacts of the project on the water quality of Kawela Stream. If shown to be necessary by the monitoring data, BMPs will be modified during construction to protect water quality.

Background information

The Hawai'i Department of Transportation (HDOT) proposes to replace Kawela Bridge, located between Milepost 5.110 and Milepost 5.118, on Kamehameha V Highway or Route 450 (hereinafter referred to as "the Project") on the southern coast of the Island of Moloka'i. The bridge crosses Kawela Stream, an interrupted stream (State Perennial Stream ID No. 4-2-15), just upstream from the *muliwai* (a coastal estuarine pond), which is not always open to the ocean (*AECOS*, 2006). Although Kawela Stream is perennial in the upper reaches, it is often dry upstream of and under the bridge.

The existing highway bridge will be removed and replaced. The footprint of the new bridge will be 5.8 m (19 ft) wider and 3.7 m (12 ft) longer than the existing bridge. The stream channel under the bridge will be lined with concrete. Grouted rock will be placed on the stream banks upstream and downstream of the concrete channel and access ramps will be constructed on both sides of the bridge. During construction of the new bridge, a temporary bypass road will be constructed on the *makai* side of the coastal highway, and will be removed once the new bridge is completed. The proposed bridge layout plan is shown in Fig. 2.

Kawela Stream is not listed as an impaired water body (HDOH, 2008); however, "South Moloka'i-Nearshore waters to 18' from southwest point - Waialua" is listed as impaired by the State. This listing means that the nearshore waters do not meet the Hawai'i water quality standards (HDOH, 2009). The geographic scope of listing is the nearshore waters from the shoreline out 5.5 m (18 ft), from the southwest point on Moloka'i to Waialua. The pollutants for which this area is listed are nutrients, turbidity, and suspended solids. As a result of this impaired listing, a study will be conducted to determine the total maximum daily load (TMDL) of pollutants that the nearshore waters of South Moloka'i can accommodate without violating Hawaii's water quality standards. A TMDL has not yet been established, and the water body has been assigned a priority code "L," indicating it has been assigned a low priority for initiating TMDL

development. Since Kawela Stream is not listed and the nearshore waters do not have a TMDL established, only those parameters listed in the General Monitoring Guidelines (HDOH, 2000) will be measured. Additional monitoring is not proposed during construction and no monitoring is proposed to determine operational impacts of the new bridge.

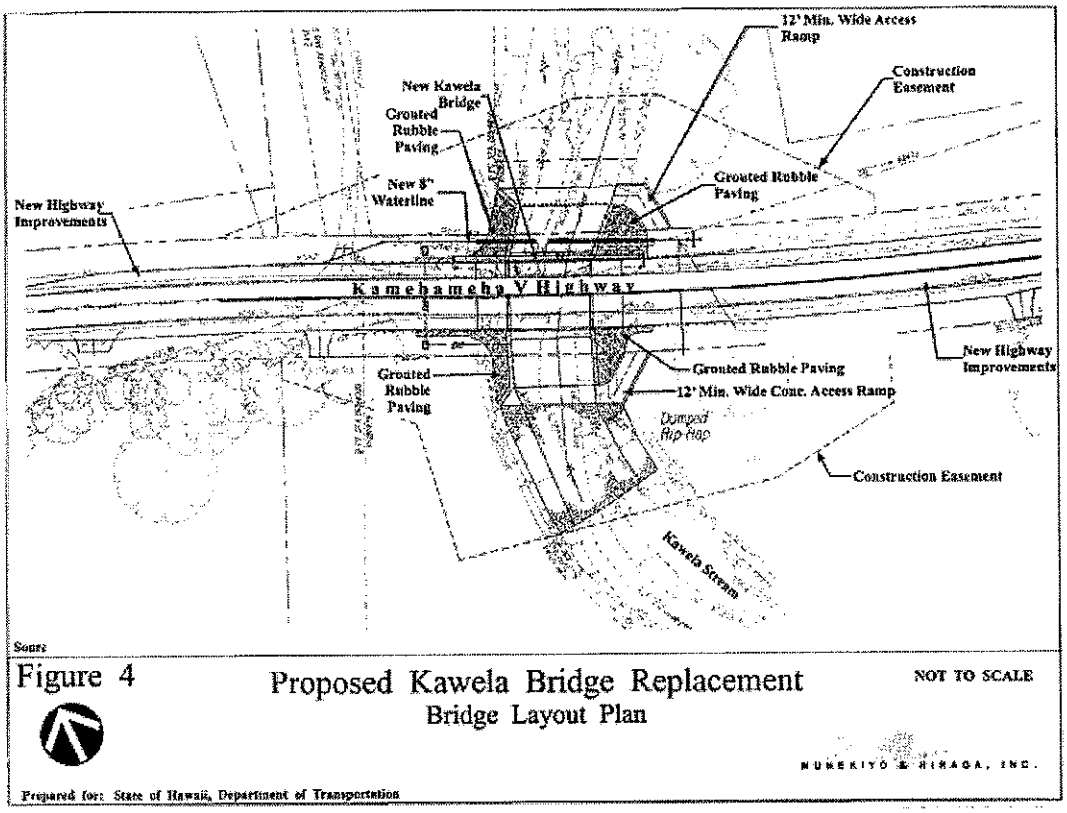


Figure 2. Proposed layout of new bridge (Munekiyo & Hiraga, 2009).

Monitoring program

The monitoring program largely follows the General Monitoring Guidelines for Section 401 Water Quality Certification Projects (HDOH, 2000).

Organization and responsibilities

The water sampling and field testing will be performed by *AECOS* field technicians experienced in water quality monitoring in Hawai'i stream

environments. Samples for turbidity and total suspended solids (TSS) will be collected and delivered to the *AECOS* Laboratory in Kāne'ohe, O'ahu for analyses.

The construction contractor's assigned representative will perform daily visual inspections and take photographs of the construction site to ensure that the construction activities do not result in adverse impacts to Kawela Stream. Sampling personnel will perform visual inspections and take photographs while sampling. Photographs of each monitoring station and areas of potential and actual disturbance will be taken. Photographs will include a date and time stamp or that information will be embedded in the metadata associated with the digital photograph files.

Information recorded by the contractor's representative and the samplers will include at a minimum: description of the construction activity, date, time, and any other observed activities, such as weather conditions, precipitation, and flow, which may not be related to construction activities but may affect water quality. A copy of the contractor's daily observations and photographs will be provided to *AECOS* for use in preparing the final report. Sampler observations will be included with the individual sampling reports. Contractor observations will be available on-site while the project is on-going. Upon project completion all observations and field books will be available (for at least five years) at the *AECOS* office for inspection by HDOH-authorized personnel during normal business hours.

Table 1 provides the names, responsibilities and qualifications of the personnel involved with this monitoring program.

Table 1. Summary of responsibilities and qualifications.

Name	Responsibility	Qualification
Snookie Mello *AECOS*, Inc. (808)234-7770	Project Manager	*AECOS* Project Manager, over 20 years project management, laboratory, and field experience
AECOS field technicians	Collect samples and perform field measurements. Photograph monitoring stations and area of potential and actual disturbance while sampling.	Trained in collecting water samples, performing field measurements in aquatic and marine environments, and monitoring construction contractors working in marine and aquatic environments.

Table 1 (continued).

Name	Responsibility	Qualification
Construction contractor representative (to be determined by contractor)	Notify AECOS and HDOT when in-stream construction will start with enough time to collect 401 WQC preconstruction samples prior to starting work. HDOT (or duly authorized representative) will notify HDOH-CWB. Make daily visual observations of BMPs and construction activity to be logged in a notebook (SM, 1998). Take photographs (with date/time stamp and description) and provide notebook and photographs to AECOS to be used as part of the assessment process. Notify HDOT of any modifications of work plan, BMPs, or AMAP. HDOT (or duly authorized representative) will notify HDOH-CWB. Investigate water quality exceedences, take corrective actions, and report findings to HDOT (or duly authorized representative) who will report it to HDOH-CWB.	Knowledgeable of construction activities as they relate to 401 WQC requirements. Familiar with Kawela or other interrupted perennial streams. Knowledgeable of WQC monitoring requirements for this project.

Parameters to be measured

Receiving water quality parameters to be measured are: temperature, dissolved oxygen (DO), pH, salinity, turbidity, and total suspended solids (TSS). Photographs will be taken during each scheduled sampling event.

Sampling locations

Four sampling stations will be established (Fig. 3). Approximate latitudinal and longitudinal coordinates for each monitoring station obtained from Google Earth follow Fig. 3. There will be one upstream control station and one downstream *muliwai* control station. Two impact stations will be monitored due to tidal influence (i.e., on a rising spring tide or during high surf water may be flowing towards the mountain through the project).

The upstream control station (UCS) will be located approximately 15 m (50 ft) upstream of the project limits, an upstream impact station (UIS) will be located 1 m (3 ft) upstream of the project limits, a downstream impact station (DIS) will be located 1 m (3 ft) downstream of the farthest downstream silt containment device, and a downstream *muliwai* control station (MCS) will be located approximately 15 m (50 ft) downstream of the project limits in the *muliwai*.

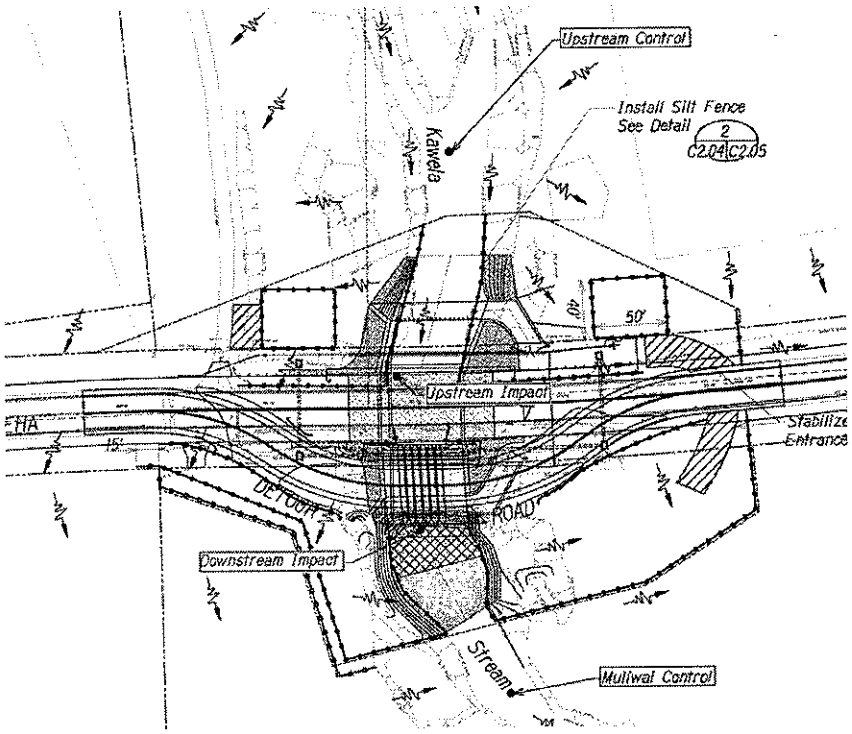


Figure 3. Kawela Bridge replacement project monitoring stations. (Figure provided by ATA).

Station Name	Latitude	Longitude
Upstream Control	21° 03'54" N	156° 56'53" W
Upstream Impact	21° 03'54" N	156° 56'55" W
Downstream Impact	21° 03'53"N	156° 56'55" W
Muliwai Control	21° 03'51"N	156° 56'56" W

Once the monitoring program begins, Global Positioning System (GPS) coordinates (with datum) of the sampling site locations will be recorded during sampling and provided to HDOH-CWB with the field notes. The sampling locations may change due to natural environmental conditions.

Sampling frequency

In-stream work will be conducted in four phases, for a total of approximately 26 months. BMPs will be installed and remain until completion of the Project. Proposed modifications to the schedule or BMPs are subject to acceptance by HDOH-CWB.

Preconstruction sampling—Prior to construction, samples will be collected once a day over a period of two weeks (or at less frequent intervals if there is more time) at the two control stations and two impact stations for a total of ten sampling events. The four sampling locations, UCS, UIS, DIS, and MCS, are shown above in Fig. 3. Collecting preconstruction samples over a longer time period will provide a representative baseline covering temporal and seasonal differences. Photographs will be taken at each station during each sampling event.

During-construction sampling—Samples will be collected from the two controls stations and two impact stations once a week. The four during-construction sampling locations, UCS, UIS, DIS, and MCS, are shown above in Fig. 3. Photographs will be taken at each station during each sampling event.

Postconstruction sampling—Postconstruction sampling will occur one time per week for three weeks once the project is completed and all in-stream BMPs are removed. The four sampling locations—UCS, UIS, DIS, and MCS—shown above in Fig. 3, will be sampled. Photographs will be taken at each station during each sampling event.

Sample collection

The field samplers will record their initials, the date, time of sample collection and time of field measurements, location, and field measurement for each sample. They will note construction activity, unusual site conditions, and condition of any treatment device or facility at the time of sample collection. Samplers will note any non-construction related activity that might impact water quality. Field personnel will record weather conditions, whether the stream is flowing, and whether stream flow is impeded from entering the ocean at the time of sampling and prior to sampling, if known. If the stream is not flowing or if the flow is too low to collect a sample at the Upstream Control

Station (UCS) or at either of the two impact stations (UIS and DIS), this information will be recorded and a photograph of the sampling stations will be taken. Photographs of each monitoring station and areas of potential and actual disturbance will be taken. Photographs will include date and time stamp or that information will be embedded in the metadata associated of digital photograph files.

Turbidity and TSS will be measured from grab samples collected by the field samplers. Temperature, salinity, and DO will be measured *in situ.* pH may be measured *in situ* or from a collected sample, but must be measured within 15 minutes of sample collection. Table 2 lists the analyses to be measured, hold times, and preservation.

Table 2. Analytical hold times and preservatives for the AMAP.

Analysis	Hold time	Preservation
Temperature	immediate	none
Salinity	immediate	none
Dissolved Oxygen	immediate	none
pH	15 minutes	none
Turbidity	48 hrs	chill on ice* to 4°C
Total Suspended Solids	7 days	chill on ice* to 4°C

*wet ice will be used in the field to chill the samples quickly.

Samples will be collected at each monitoring station. A one-liter plastic bottle will be used for turbidity and TSS analysis. Prior to collecting a sample, each plastic bottle will be pre-rinsed with the water to be sampled. The samples will be collected just below the surface by facing the bottles upstream to fill. Once collected, sample bottles will be tightly capped and placed in a cooler on ice until they are received by the laboratory. pH may be measured out of a bottle or beaker (used only for pH measurement) within 15 minutes of collection if it is not measured *in situ.*

Field analysis

Temperature and DO will be measured with the DO meter, pH will be measured with a pH meter, and salinity will be measured with a handheld refractometer or a DO meter that also measures salinity. Analysis of pH must be undertaken within 15 minutes of sample collection. Temperature and DO should be made *in situ*, if conditions allow. Salinity and pH may be measured from a sample collected specifically for those analyses. Table 3 provides information on the methods and instruments to be used.

Table 3. Analytical methods and instruments to be used in the field for the AMAP.

Analysis	Units	Method	Reference	Instrument*
Temperature	°C	SM 2550B	SM (1998), YSI manual	YSI DO thermistor
Salinity	psu	Refractive index	Refractometer instructions, YSI manual	Hand held refractometer or YSI 85
Dissolved Oxygen	mg/L	SM 4500-O G / membrane electrode	SM (1998), YSI manual	YSI Do meter 550 or 85
pH	standard units	SM4500-H^+	SM (1998)	Hanna pHEP 5 pocket pH meter

*A typical instrument is listed; other manufacturers may be substituted.

All instrument calibration procedures will be undertaken prior to field measurements. pH, temperature, salinity, and DO will be measured in the field. Meter calibration procedures are outlined in the manufacturer instructions and standard operating procedures (SOP) specifically written for the refractometer, pH, and DO meters to be used (*AECOS*, Inc. 2005, 2010a, 2010b; HACH 2008a, 2008b; Hanna Instruments, 2005; YSI Incorporated, 2007, 2009). Operation and calibration will only be performed by personnel who have been properly trained in these procedures. Documentation of calibration and any maintenance information will be maintained in appropriate field or log books. All calibrations will be made prior to analyzing the samples.

Any field equipment that has been shown by calibration or otherwise to be defective, is to be taken out of service until it has been repaired. The equipment is

placed back in service only after verifying by calibration that the equipment performs satisfactorily. If at any time calibration and maintenance is beyond the capability of the trained personnel, the Project Manager will be notified. An attempt will be made to solve the problem. If the equipment or instrument still cannot be repaired, the equipment will be taken out of service and sent for repair and replacement equipment will be obtained from the laboratory.

Chain of Custody procedures

Once samples have been obtained and site conditions and field measurements have been properly documented in the field notebook, a written record of the chain of custody of the samples must be made for the turbidity and total suspended solids analyses. A chain of custody (COC) form will be filled out and accompany the samples to the laboratory; information on the form will state which analyses are to be performed (Appendix A). The form will identify the samples, so the laboratory can report the analytical results by sample ID. When transferring possession of samples, the sampler will sign and record the date and time on the COC record. Each person who takes custody will fill in the appropriate section of the COC record.

Laboratory analysis

The laboratory will document the analytical procedures used and any relevant Quality Assurance/Quality Control (QA/QC) and instrument calibration information pertaining to the specific analyses. All analytical results and field notes will be entered into a notebook or file established for this purpose, and will be provided in a final report prepared for the monitoring program. This file, including relevant QA/QC results, will be retained in the laboratory records up to 5 years and will be available for inspection by HDOH-authorized personnel during normal business hours.

The laboratory will participate annually in US Environmental Protection Agency (USEPA)-certified provider water studies for water pollution and water supply for turbidity and total suspended solids determination.

TSS and turbidity will be analyzed at the laboratory. Table 4 provides information on laboratory methods and instruments to be used.

Table 4. Analytical methods and instruments to be used in the laboratory for the AMAP.

Analysis	Units	Method	Reference	Instrument*
Turbidity	ntu	EPA 180.1, rev. 2.0	USEPA (1993)	2100N Hach Turbidimeter
Total Suspended Solids	mg/l	SM 2540D	SM (1998)	Mettler H31

* Typical instruments are listed; other manufacturers may be substituted.

Data Quality Objectives and criteria for measurement data

Data quality objectives (DQOs) are qualitative and quantitative statements developed through a seven-step process based on USEPA guidance for developing DQOs (USEPA, 2006). The project-specific DQOs below describe each step and how it pertains to the monitoring and assessment of water quality during this project.

Step 1: State the problem

The Project will require in-stream work that includes lining the stream bed and bank with concrete, placing grouted rock on the stream banks upstream and downstream of the concrete channel, construction of access ramps on both sides of the bridge, and construction of a temporary diversion bridge. Kawela Stream flows into the Pacific Ocean immediately downstream of the Project. Potential impacts from construction include introducing sediment into Kawela Stream and the nearshore waters of the Pacific Ocean. Cement pours may increase pH. This monitoring program is designed to monitor potential impacts from construction activity to the stream.

Step 2: Identify the decision

The intent of the applicable monitoring and assessment program (AMAP) is to conduct water sampling and analysis that will monitor the proposed in-stream and stream bank work. The intent of this AMAP is to (1) ascertain that the Best Management Practices (BMPs) for the project are adequate to comply with State water quality standards, (2) promptly determine if BMPs are inadequate so that modification of the BMPS can be implemented in a timely manner to bring the

activity into compliance; and (3) serve as a basis for self-compliance, so that activities associated with the proposed action can proceed within the parameters required by State water quality standards.

Step 3: Identify the inputs to the decision

The data that are collected as a part of the AMAP will be used in the decision rules to determine if the objectives listed above are being met. Preconstruction monitoring results will be used to assess baseline conditions. Field measurements, field notes, and turbidity results will be reported to HDOH-CWB by facsimile or via email. Preconstruction data will be tabulated and arithmetic and geometric (as appropriate) means will be calculated upon completion of preconstruction sampling.

During construction all data and photos will be transmitted to HDOH0-CWB by HDOT (or it's duly authorized representative). During construction, field measurements will be faxed or emailed (as pdf) and color photos will be emailed to HDOH-CWB by close of business the day following sampling or the first business day following holidays, furlough days or weekends. During construction, laboratory data, will be transmitted by facsimile to HDOH-CWB (808-586-4352) or email cleanwaterbranch@doh.hawaii.gov within 24 hours or the first business day following holidays, furlough days and weekends. Brief reports of analytical results will be compiled within two weeks after completion of all analyses for each sampling event. The reports will include a running statistical summary (after three water samples have been collected) for the current phase of the project.

Post-construction monitoring will be conducted three times after construction is completed. Data will be tabulated and arithmetic and geometric (as appropriate) means will be calculated. Data will be used to assess whether the objectives listed in Step 2 have been met.

Step 4: Define the study boundaries

Data collection will be limited both spatially and temporally. Temporally, data collection will be limited to three monitoring phases extending from two weeks prior to construction to three weeks after the end of construction. Construction is expected to require approximately 26 months of in-stream and stream bank work. Sampling will occur ten times (once a day for two weeks, or less frequently if time allows) during the preconstruction sampling phase, one time a week during construction, and three times (once a week for three weeks) during the post-construction phase. Data will be collected from the two control

and two impact stations during preconstruction, during-construction, and postconstruction sampling.

Spatially, the monitoring plan will be limited to four stations in the receiving waters of Kawela Stream, two control stations and two impact stations. Sta. USC will monitor the quality of the water 15 m (50 ft) upstream of the construction site. Sta. UIS will monitor the quality of the water 1 m (3 ft) upstream of the construction site and Sta. DIS will monitor the quality of the water 1 m (3 ft) downstream of the construction site. Sta. MCS will monitor the quality of the water approximately 15 m (50 ft) downstream of the project limits. Sampling locations are shown in Fig. 3. Data collected will monitor the effects of the project construction on water quality at each station, allowing a determination of the effectiveness of the project BMPs to be made.

Step 5: Develop a decision rule

The results of this study will be evaluated against the decisions outlined during Step 2 of the DQO process. If the measured parameters at the impact stations exceed Hawai'i water quality standards, and the exceedence is not related to ambient conditions, it could be necessary to repair or modify the BMPs to improve water quality.

During field sampling, samplers are required to take field notes, which are described in the Sample Collection section. High surf and high tide may cause Kawela Stream to flow towards the source and away from the mouth. Samplers will note which direction the water is flowing. The terms up current and down current are used in this monitoring program to define the direction of water flow. Up current in this monitoring program is specifically defined as that water which has not flowed through or been impacted by the Project. Down current is specifically defined as that water that flowed through or may have been impacted by the Project. If at any time it is noted that there is a turbidity plume extending beyond the BMPs and the plume is associated with construction, all work should stop until the cause is determined and corrected.

The following numerical references for turbidity and TSS will evaluated and finalized following the analysis of all preconstruction data to establish baseline "grey area" and "95% probability area." If the turbidity at the downstream *muliwai* control station at any time exceeds any of these numerical references:

- 20% greater than the turbidity at the upstream control station,
- the turbidity exceeds the 95% probability level as calculated from the preconstruction monitoring data

or if the total suspended solids (TSS) at the downstream *muliwai* control station at any time exceeds any of these two numerical references:

- 20% greater than the TSS at the upstream control station,
- the TSS exceeds the 95% probability level as calculated from the preconstruction monitoring data

or if pH results at the down current control stations:

- fall outside of the range of 7.0 to 8.6 (pH criteria for estuary and open coastal waters near a stream);

then, a determination must be made whether the cause is attributable to construction (i.e., BMP failure) or a non-construction activity. The field sampler or laboratory analyst will notify the *AECOS* project manager of the exceedances. The project manager will notify the contractor's representative. If the field samplers notice a problem in the field, they will notify the contractor's representative directly, or if the representative is not available, the on-site manager. The contractor's representative or on-site manager will attempt to track the cause of the exceedance. If it is determined that construction is causing the problem, then the activity responsible should cease until the problem is corrected. The contractor will verbally notify HDOH-CWB of the problem and any corrective action taken. If the discharge event is caused by other factors, then the contractor will report the findings (with material evidence) to HDOH-CWB.

Step 6: Specify tolerable limits on decision errors

Environmental decisions are uncertain. Some uncertainty will be the result of sample design errors and some uncertainty will be the result of measurement errors. When examining the data against the decision rules (Step 5), a decision must be made if the data show the water quality of the stream is within the range of ambient conditions (null hypothesis) or if the water quality of the stream is affected by construction activities. Two potential decision errors exist, Type I—false rejection of the null hypothesis (conclude a water quality impact has occurred where one has not) or Type II—false acceptance of the null hypothesis (conclude no water quality impact has occurred where one has). The tolerable limit on decision errors is set at >80%, it is assumed that differences in the percent change can be negative or positive (two-sided t-test), and the α significance level is set at 0.05.

To address decision errors that are the result of measurement errors, quality controls will be conducted on approximately 10% of the field measurements and samples collected and analyzed in the laboratory. Acceptable relative percent differences for field duplicates are 75% or less. Laboratory control

limits for quality control samples is established between 90% and 110%. Replicate analysis will be performed in 10% of the samples.

Step 7: Optimize the design

The sampling locations and sampling frequency were developed in accordance with water quality regulations promulgated in Hawai'i Administrative Rules (HAR) Chapter 11-54 (HDOH, 2009) and the General Monitoring Guideline for Section 401 Water Quality Certification Projects (HDOH, 2000). This sampling program may be modified based on analysis of data, visual observations, changes in construction, changes in environmental conditions, and other information that may become available during construction. Optimization of the design, if necessary, will improve monitoring and assessment of construction impacts on Kawela Stream.

Reports and assessment

A preconstruction monitoring report will assess water quality and compare baseline data to applicable Hawai'i water quality standards. This report will be prepared within 45 days of completion of preconstruction monitoring and analysis. Tabulated data and statistical analysis need to meet DQOs will be available prior to the commencement date of the proposed construction activities. The data will be used to set decision rule limits appropriate for the project. HDOT or its assigned representative will mail the completed report to HDOH-CWB.

Draft results of during-construction monitoring for field measurements, color photos and turbidity will be sent via facsimile or email (as a pdf) by HDOT (or its dully authorized representative) to HDOH-CWB within 24 hours or the first business day after they become available. *In situ* sampling results will be submitted by HDOT or its assigned representative via facsimile or email (as a pdf) within 24 hours or by the next business day. Depending on sample load in the laboratory, turbidity will be submitted within 72 hours and TSS within 8 days. Within two weeks of completing all analyses, *AECOS* will mail a typed report of results to the HDOT, Highways Division. The report will also be sent to HDOH-CWB via facsimile (808)586-4352 or email (as a pdf) at cleanwaterbranch@doh.hawaii.gov. These reports will have a running statistical summary (provided there are sufficient data for statistical analysis) for each phase of the project. These reports will also include field notes.

A final report and water quality assessment will be prepared upon completion of the monitoring program. This report will be submitted by HDOT or its

assigned representative to HDOH-CWB within 60 days following completion of post-construction monitoring and analysis. The final report will identify the methods and procedures for analytical measurements and include all data collected as well as statistical summaries of results by station and activity phase (preconstruction, during construction, and postconstruction). This report will also assess whether water quality was impacted by the construction activity. Upon completion of the monitoring program, the contract laboratory will retain the original data and field notebook for a minimum of five years.

References

AECOS, Inc. 2005. YSI 550 – Handheld Dissolved Oxygen and Temperature Meter Standard Operating Procedure (SOP). 4 pp.

_____. 2006. Water quality and biological surveys of Kawela Stream, Kawela, Moloka'i, Hawai'i. Prep. for Kai Hawaii. 12 pp.

_____. 2010a. pH meter micropHep 5 Standard Operating Procedure (SOP). 3 pp.

_____. 2010b. YSI 85—Handheld Oxygen, Conductivity, Salinity and Temperature Meter Standard Operating Procedure (SOP). 6 pp.

HACH Company. 2008a. Model 2100 N Laboratory Turbidimeter Instruction Manual. 80 pp.

_____. 2008b. PORTABLE TURBIDIMETER Model 2100P Instrument and Procedure Manual. 78 pp.

Hanna Instruments. 2005. Instruction Manual HI 98127 HI 98128 Waterproof pH Testers with Replaceable Electrode. 2 pp.

Hawai'i Department of Health (HDOH). 2000. General monitoring guideline for Section 401 Water Quality Certification Projects. Available online at: URL: http://hawaii.gov/health/environmental/water/cleanwater/forms/cleanwater/forms/pdf/matrix.pdf]. Last accessed November 16, 2009.

_____.2008. 2006 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and The U.S. Congress Pursuant To Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117). 279 pp.

_____. 2009. Hawai'i Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards. State of Hawai'i, Department of Health. 90 pp.

Munekiyo & Hiraga, Inc. 2009. Attachment "B" to CWA 401 Water Quality Certification Application. 10 pp.

Mettler Toledo GmbH, Laboratory & Weighing Technologies. 2000. Operating instructions METTLER TOLEDO AG balances. 82 pp.

Standard Methods (SM). 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 pp.

US Environmental Protection Agency (USEPA). 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. EPA 600/R-93/100. U.S.

_____. 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4. EPA/240/B-06/001. 121 pp.

YSI, Incorporated. 2007. YSI 85 Handheld Oxygen, Conductivity, Salinity, Temperature System Operations Manual. 60 pp.

_____. 2009. YSI 550A Dissolved Oxygen Instrument Operations Manual. 18 pp.

Appendix A

AECOS, Inc.
Chain of Custody Form

AECOS, Inc.

45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

CHAIN OF CUSTODY FORM

PROJECT FILE No.

LOG NUMBER [ ]

CLIENT:
ADDRESS:

CONTACT:
PHONE No.: ☎
Purchase Order No.:

☐ RUSH
☐ SEE REVERSE
SPECIAL INSTRUCTIONS

	☒	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	SAMPLE TYPE	CONTAINER(S)		REQUESTED ANALYSES	PRESERVATION
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

CLIENT PROVIDES SAMPLES TO THE LABORATORY SHOULD COMPLETE AS MUCH OF THE ABOVE FORM AS POSSIBLE. NOTE NAME AND DATE/SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW ⚓. INFORMATION REQUESTED IN SHADED BOXES ABOVE TO BE FILLED IN BY THE LABORATORY.

SAMPLED BY: DATE 20___
PRINT NAME
RELINQUISHED: DATE 20___
SIGNATURE TIME

COMMENTS:

RECEIVED BY: DATE 20___
SIGNATURE TIME
RELINQUISHED: DATE 20___
SIGNATURE OR INITIALS TIME

PRECAUTIONS:

RECEIVED FOR LABORATORY: DATE 20___
SIGNATURE TIME
RELINQUISHED: DATE 20___
SIGNATURE OR INITIALS TIME

DISPOSAL:

USE (BLACK) INK

RETURN SAMPLE TO CLIENT ☐

NOTE: IF ANY INFORMATION IS PROVIDED ON THIS SIDE OF FORM, CHECK THE "SEE REVERSE" BOX ON THE FRONT SIDE OF FORM

ADDITIONAL CUSTODY RECORD
TRANSPORTERS

RECEIVED BY: DATE
20___
SIGNATURE TIME

RELINQUISHED: DATE
20___
SIGNATURE OR INITIALS TIME

RECEIVED BY: DATE
20___
SIGNATURE TIME

RELINQUISHED: DATE
20___
SIGNATURE OR INITIALS TIME

RECEIVED BY: DATE
20___
SIGNATURE TIME

RELINQUISHED: DATE
20___
SIGNATURE OR INITIALS TIME

RECEIVED BY: DATE
20___
SIGNATURE TIME

RELINQUISHED: DATE
20___
SIGNATURE OR INITIALS TIME

☐ SEND INVOICE TO
(ONLY IF DIFFERENT FROM CLIENT):

FIRM:
ADDRESS:

ATTN:

Purchase Order No.:

☐ SEND RESULTS TO
(ONLY IF DIFFERENT FROM CLIENT):

FIRM:
ADDRESS:

ATTN:

☐ SPECIAL INSTRUCTIONS:

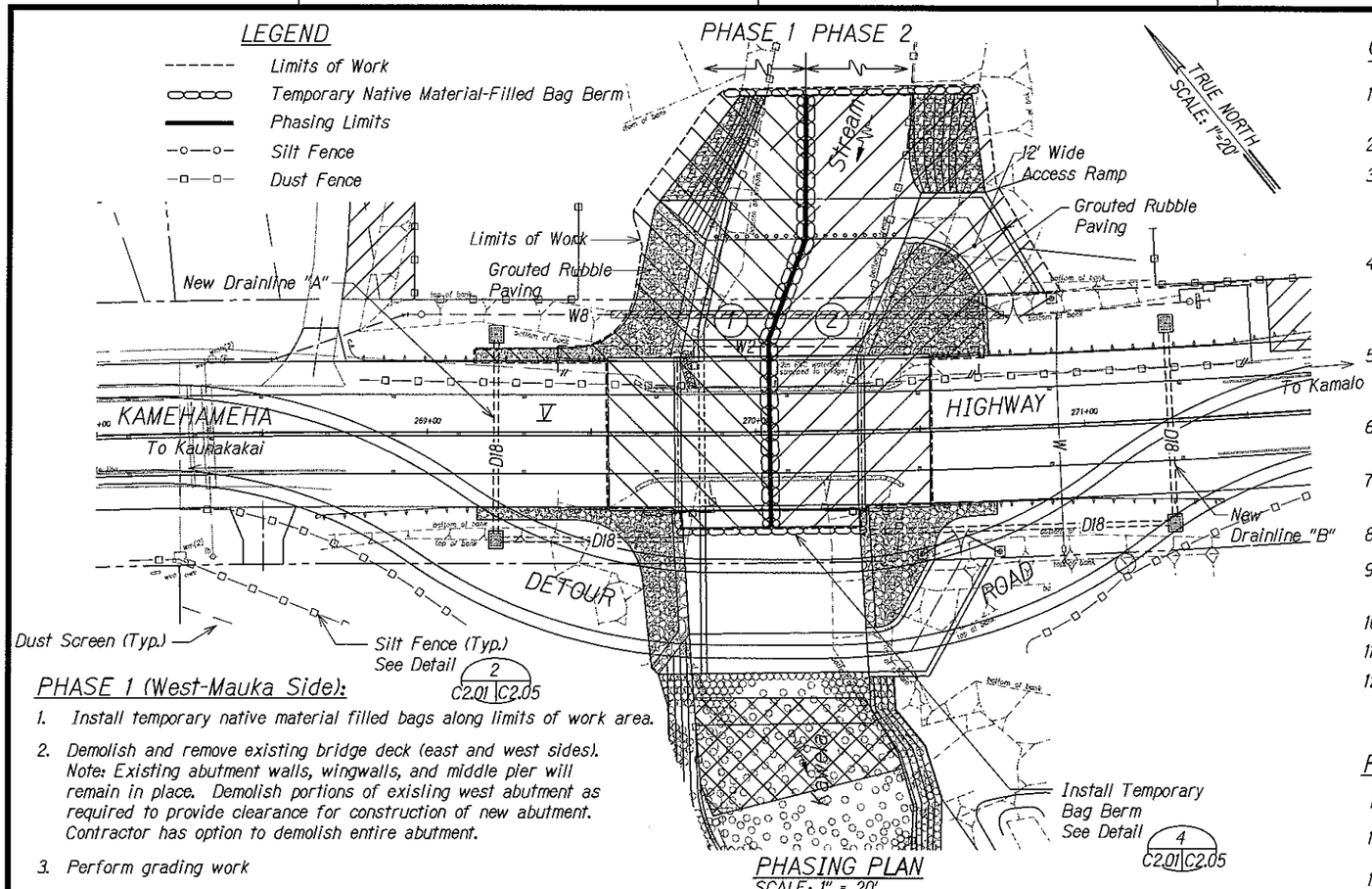
PLEASE INITIAL HERE:

DRAW MAP OR DIAGRAM OF SAMPLE SITES HERE

ATTACHMENT F.

Construction Phasing Plan, Sheet Nos. C2.01 and C2.02

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	15	93



PHASING PLAN
SCALE: 1" = 20'

PHASE 1 (West-Mauka Side):

1. Install temporary native material filled bags along limits of work area.
2. Demolish and remove existing bridge deck (east and west sides). Note: Existing abutment walls, wingwalls, and middle pier will remain in place. Demolish portions of exisling west abutment as required to provide clearance for construction of new abutment. Contractor has option to demolish entire abutment.
3. Perform grading work
4. Install new waterline and portion of Drainline "A" not within the Detour Road.
5. Construct new abutment wall and CRM wall (west side). Note: Do not backfill new abutment wall and CRM wall unlil specified stage during Phase 2.
6. Demolish remaining portions of existing abutment wall and wingwall (west side) if applicable.
7. Install new concrete channel lining & GRP along streambank (west side).
8. Remove temporary native material-filled bags along mauka and makai limits of work area.

PHASE 2 (East-Mauka Side):

1. Install temporary native material-filled bags along mauka and makai limits of work area.
2. Demolish portions of existing east abutment as required to provide clearance for construction of new abutment. Contractor has option to demolish entire abutment.
3. Perform grading work.

PHASE 2 (East-Mauka Side): Continued

4. Install new water line and portion of Drainline "B" not within the Detour Road.
5. Construct new abutment wall and CRM wall, including concrete access ramp (east side). Note: Do not backfill new abutment wall and wingwall until later stage of Phase 2
6. Demolish remaining portions of existing abutment wall and wingwall (east side), including middle pier, if applicable.
7. Install new concrete channel lining & GRP along streambank (east side)
8. Install girders and construct new bridge deck, including concrete bridge railings.
9. Backfill behind west and east abutment walls. See Sht. S1.2 for additional backfill requirements.
10. Backfill behind mauka CRM walls (east and west sides), and constructed portions of makai CRM walls (east and west sides).

General Sequence of Work:

1. Install temporary erosion control measures including silt fence and dust screen. See Sheet C2.03
2. Clear and grub mauka and makai sides of bridge for access to work areas.
3. Contractor shall trim back trees along privale dirt road (mauka side of Kamehameha V Highway) so MECO can install temporary overhead lines to private residence on mauka side of Highway. (Contraclor shall coordinate this work with MECO personnel).
4. Install temporary utility poles and overhead lines along mauka side of bridge (Work to be performed by MECO, Hawaiian Telcom, and Oceanic Time Warner Cable.) Note: Contractor shall coordinate this work with the respective utility companies.
5. Remove existing utility poles and overhead lines. (Work to be performed by MECO, Hawaiian Telcom, and Oceanic Time Warner Cable.) Note: Contractor shall coordinate this work with the respective utility companies.
6. Construct temporary Delour Road (including installation of temporary culverts within stream channel) on the makai side of bridge.
7. Install traffic control signs and route traffic along temporary Detour Road on makai side of bridge.
8. Perform Phase 1 and Phase 2.
9. Re-route traffic to Kamehameha V Highway and across new bridge. The makai lane will need to be closed before completing installation of Drainlines "A" & "B"
10. Remove temporary Detour Road.
11. Perform Phase 3 and Phase 4.
12. Install permanent erosion control measures, and existing vegetation shall be restored.

PHASE 2 (East-Mauka Side): Continued

11. Remove existing A.C. pavement along Kamehameha V Highway.
12. Install fill along Highway.
13. Install new concrete approach slabs (west and east sides)
14. Inslall GRP behind mauka CRM walls (east and west sides), and behind constructed portions of makai CRM walls (east and west sides).
15. Install portions of water laterals not within the Detour Road
16. Install new pavement and striping along Highway.
17. Install new guardrails along Highway.
18. Remove temporary native material-filled bags along limits of work area.

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

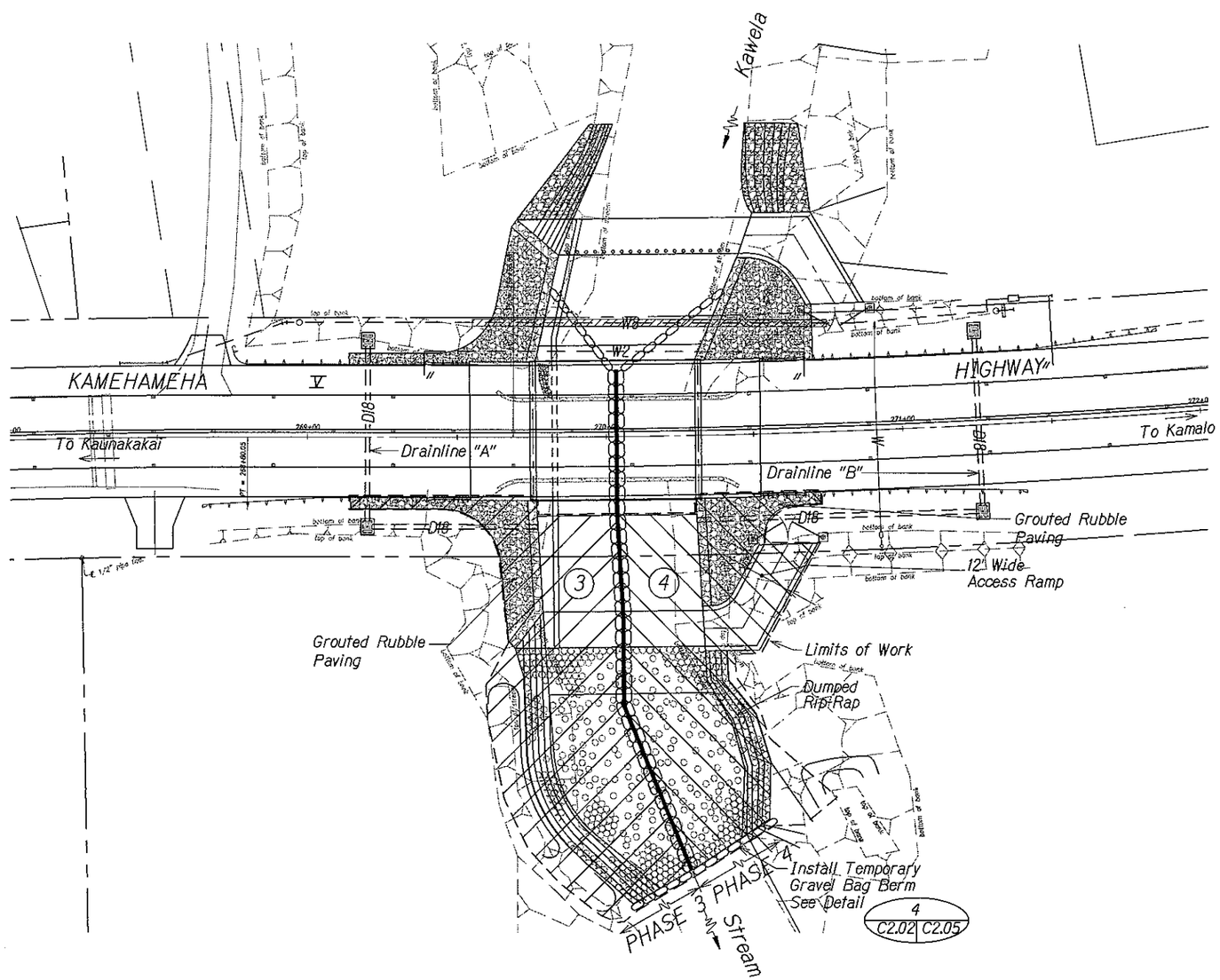
PHASING PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C2.01 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	16	93



TRUE NORTH
SCALE: 1"=20'

PHASE 3 (West-Makai Side):

1. Install temporary native material-filled bags along limits of work area.
2. Install remaining portions of new Drainline "A".
3. Construct new CRM wall (west side).
4. Install new concrete channel lining (west side)
5. Install backfill behind new CRM wall (west side)
6. Install boulder rip-rap within stream channel (west side).
7. Install grouted rubble paving along the top of new CRM wall.
8. Remove temporary native material-filled bags along mauka and makai limits of work area.

PHASE 4 (East-Makai Side):

1. Install temporary native materiall-filled bags along mauka and makai limits of work area.
2. Install remaining portions of new Drainline "B".
3. Construct new CRM wall, including concrete access ramp (east side).
4. Install new concrete channel lining (east side)
5. Install backfill behind CRM wall
6. Install boulder rip-rap within stream channel (east side).
7. Install grouted rubble paving behind new CRM wall (east side).
8. Install remaining portions of new Water Laterals (east side).
9. Remove temporary native material-filled bags along limits of work area.

PHASING PLAN

SCALE: 1" = 20'

LEGEND

- Limits of Work
- Temporary Native Material-Filled Bag Berm
- Phasing Limits

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PHASING PLAN

KAMEHAMEHA V HIGHWAY
Kowelo Bridge Replocement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C2.02 OF 93 SHEETS

ATTACHMENT G.

Erosion Control Notes, Sheet Nos. C1.06, C1.07, and C1.08 and Erosion Control Plan, Sheet Nos. C2.03, C2.04, C2.05, C2.06, C2.07, C2.08, C2.09, and C2.10

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	7	90

WATER POLLUTION AND EROSION CONTROL NOTES:

A. GENERAL:

1. See Section 209 - Water Pollution and Erosion Control. Section 209 describes but is not limited to: submittal requirements; scheduling of a water pollution and erosion control conference with the Engineer; construction requirements; method of measurement; and basis of payment.

2. Effective October 1, 2008, follow the guidelines in the "Construction Best Management Practices Field Manual," dated January 2008 in developing, installing and maintaining the Best Management Practices (BPM) for the project.

3. Follow the guidelines in the Honolulu's City & County "Rules Relating to Soil Erosion Standards and Guidelines" along with applicable Soil Erosion Guidelines for projects on Maui, Molokai, Kauai, and Hawaii.

4. The Engineer may assess liquidated damages of up to $27,500 for non-compliance of each BMP requirement and each requirement stated in Section 209, for every day of non-compliance. There is no maximum limit on the amount assessed per day.

5. The Engineer will deduct the cost from the progress payment for all citations received by the Department for non-compliance, or the Contractor shall reimburse the State for the full amount of the outstanding cost incurred by the State.

6. For projects that require an NPDES permit from the Department of Health, install a rain gage prior to any field work including the installation of any site-specific best management practices. The rain gage shall have tolerance of at least 0.05 inches of rainfall, have an opening of at least one-inch in diameter. Install the rain gage on the project site in area that will not deter rainfall entering the gage opening. The rain gage installation shall be stable and plumbed. Do not begin field work until the rain gage is installed and site-specific best management practices are in-place.

B. WASTE DISPOSAL:

1. Waste Materials
Collect and store all waste materials in a securely lidded metal dumpster. The dumpster shall meet all local and State solid waste management regulations. Deposit all trash and construction debris from the site in the dumpster. Empty the dumpster a minimum of twice per week or as often as is deemed necessary. Do not bury construction waste materials onsite. The Contractor's supervisory personnel shall be instructed regarding the correct procedure for waste disposal. Post notices stating these practices in the office trailer and the Contractor shall be responsible for seeing that these procedures are followed.

2. Hazardous Waste
Dispose all hazardous waste materials in the manner specified by local or State regulations and by the manufacturer. The Contractor's site personnel shall be instructed in these practices and shall be responsible for seeing that these practices are followed.

3. Sanitary Waste
Collect all sanitary waste from the portable units a minimum of once per week, or as required.

C. EROSION CONTROL AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES:

1. Inspect all control measures at least once each week and within 24 hours of any rainfall event of 0.5 inches or greater within a 24 hour period.

2. Maintain all measures in good working order. If repair is necessary, it shall be initiated within 24 hours after the inspection.

3 Remove built-up sediment from silt fence when it has reached one-third the height of the fence.

4. Inspect silt screen or fence for depth of sediment, tears, to verify that the fabric is securely attached to the fence posts or concrete slab and to verify that the fence posts are firmly in the ground. Inspect and verify the bottom of the silt screen is buried a minimum of 6 inches below the existing ground.

5. Inspect temporary and permanent seeding and planting for bare spots, washouts and healthy growth.

6. Make a maintenance inspection report promptly after each inspection. Submit a copy to the Engineer no later than one week from the date of the inspection.

7. Provide a stabilized construction entrance to reduce vehicle tracking of sediments. Include stabilized construction entrance in the Water Pollution, Dust and Erosion Control submittals. Minimum length should be 50 feet. Minimum width should be 30 feet. Minimum depth should be 12 inches or as recommended by the soils engineer and underlain with geo-textile fabric. Clean the paved street adjacent to the site entrance daily or as required to remove any excess mud, cold planed materials, dirt or rock tracked from the site. Cover dump trucks hauling material from the construction site with a tarpaulin.

8. Include designated Concrete Washout Area(s) in the Water Pollution, Dust, and Erosion Control submittals.

9. Submit the name of a specific individual designated responsible for inspections, maintenance and repair activities and filling out the inspection and maintenance report.

10. Personnel selected for the inspection and maintenance responsibilities shall received training from the contractor. They shall be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

11. The Contractor shall contain, remove and dispose slurry generated from saw cutting of pavement in accordance with approved BMP practices. Payment for confinement, removal, and disposal of slurry shall be considered incidental to the various contract items.

D. GOOD HOUSEKEEPING BEST MANAGEMENT PRACTICES:

1. Materials Pollution Prevention Plan

a. Applicable materials or substances listed below are expected to be present onsite during construction. Other materials and substances not listed below shall be added to the inventory.

Concrete	Fertilizer
Detergents	Petroleum Based Products
Paints (enamel and latex)	Cleaning Solvents
Metal Studs	Wood
Tar	Masonry Block

b. Use Material Management Practices to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff. Make an effort to store only enough product as is required to do the job.

c. Store all materials onsite in a neat, orderly manner in their appropriate containers and if possible under a roof or other enclosure.

d. Keep products in their original containers with the original manufacturer's label.

e. Do not mix substances with one another unless recommended by the manufacturer.

f. Whenever possible, use a product up completely before disposing of the container.

g. Follow manufacturer's recommendations for proper use and disposal.

h. Conduct a daily inspection to ensure proper use and disposal of materials onsite.

2. Hazardous Material Pollution Prevention Plan

a. Keep products in original containers unless they are not resealable.

b. Retain original labels and material safety data sheets (MSDS).

C. Dispose of surplus products according to manufacturer's instructions and local and State regulations

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Kent R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

WATER POLLUTION AND EROSION CONTROL NOTES

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C106 OF 86 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	8	90

WATER POLLUTION AND EROSION CONTROL NOTES:

E. GOOD HOUSEKEEPING BEST MANAGEMENT PRACTICES: -Cont.

1. Onsite and Offsite Product Specific Plan
The following product specific practices shall be followed onsite:

a. Petroleum Based Products:
Monitor all onsite vehicles for leaks and perform regular preventive maintenance to reduce the chance of leakage. Store petroleum products in tightly sealed containers which are clearly labeled. Apply asphalt substances used onsite according to the manufacturer's recommendation.

b. Fertilizers:
Apply fertilizers used only in the minimum amounts recommended by the manufacturer. Once applied, work fertilizer into the soil to limit exposure to storm water. Storage shall be in a covered shed. Transfer the contents of any partially used bags of fertilizer to a sealable plastic bin to avoid spills.

c. Paints:
Seal and store all containers when not required for use. Do not discharge excess paint to the highway drainage system. Dispose properly according to manufacturers' instructions or State and local regulations

d. Concrete Trucks:
Wash out or discharge concrete truck drum wash water only at a designated site. Do not discharge water in the highway drainage system or waters of the United States. Contact Drinking Water Branch, Department of Health at 586-4258 to receive permission to designate a disposal site. Clean disposal site as required or as requested by the Owner's representative.

2. Spill Control Plan

a. Post a spill prevention plan to include measures to prevent and clean up each spill.

b. The Contractor shall be the spill prevention and cleanup coordinator. Designate at least three site personnel who shall receive spill prevention and cleanup training. These individuals shall each become responsible for a particular phase of prevention and cleanup. Post the names of responsible spill personnel in the material storage area and in the office trailer onsite.

c. Clearly post manufacturers' recommended methods for spill cleanup. Make site personnel aware of the procedures and the location of the information and cleanup supplies.

d. Keep materials and equipment necessary for spill cleanup in the material storage area onsite.

e. Clean up all spills immediately after discovery.

f. Keep the spill area well ventilated. Personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

g. Report spills of toxic hazardous material to the appropriate State or local government agency, regardless of the size.

F. PERMIT REQUIREMENTS:

1. If a National Pollution Discharge Elimination System (NPDES) Permit is required for Construction Activities of one acre or more, submit to the Engineer six sets of the Water Pollution and Erosion Control Submittals as detailed in Subsection 209.03 of the specifications.

2. If an NPDES Permit for Construction Dewatering is required, the Contractor shall be responsible to obtain the Permit from the Department of Health, Clean Water Branch.

3 The Contractor shall comply with all applicable State and Federal Permit conditions. Permits may include but are not limited to the following:

a. NPDES Permit for Construction Activities
b. NPDES Permit for Construction Dewatering
c. NPDES Permit for Hydrotesting Waters
d. Water Quality Certification
e. Stream Channel Alteration Permit
f. Section 404 Army Corps of Engineer Permit

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Kent R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

WATER POLLUTION AND EROSION CONTROL NOTES

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C1.07 OF 86 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	9	93

ENVIRONMENTAL PROTECTION NOTES

1. The Contractor, at his own expense, shall provide effective measures for the control of fugitive dust emissions from the project and surrounding areas caused by his operations. These measures shall meet the requirements of State Administrative Rules, Department of Health, Air Pollution Control (11-60.1).

2. All grading operations shall be performed in conformance with the applicable provisions of the grading ordinance to prevent violation of the State Administrative Rules, Department of Health, Water Pollution Control and Water Quality Standards (11-54, 11-55) due to erosion and run off to State waters.

3. Grub material, and construction wastes shall be disposed of at an authorized site having a Department of Health Solid Waste Management Permit. Open burning is prohibited.

4. Permits Required:

   A. A NPDES Permit is required to be obtained from the Clean Water Branch of the Department of Health for storm water discharge, hydrotesting and dewatering.

   B. Permit must be obtained prior to start of construction.

5. Environmental protection notes pertaining to air and water pollution shall be administered and monitored by the Department of Health.

6. The Contractor shall remove all silt and debris resulting from his work and deposited in drainage facilities, roadways and other areas. The cost incurred for any necessary remedial action by the Engineer shall be payable by the contractor.

7. All excess material shall be removed from the project site.

8. Planting and maintenance of grass shall conform to section 641 "Hydro-Mulch Seeding" of the "Hawaii Standard Specifications for Road and Bridge Construction", 2005, as amended.

TEMPORARY DUST CONTROL MEASURES

1. The graded or project site that is cleared of vegetation shall be kept damp for seven (7) days a week. At the end of each day, the site shall be sufficiently dampened so that the site will remain moistened during the night.

2. The Contractor shall conduct his operations so that excavation, embankment, and imported material shall be dampened to prevent dust problems.

3. In applying for a grading permit, the Contractor shall submit plans, schedules and/or written measures which provide for dust control. The Dust Control Measures shall contain positive statements which require actions or work that prevent dust problems. No permits will be issued unless the State is assured that dust problems will be minimized.

4. The Contractor shall maintain a suitable water system and dampen the graded or grubbed site with water.

U.S. FISH AND WILDLIFE SERVICE RECOMMENDED STANDARD BEST MANAGEMENT PRACTICES

The Fish and Wildlife Service recommends that the following measures be incorporated into projects to minimize the degradation of water quality and adverse impacts to fish and wildlife resources.

1. The Turbidity and siltation from project-related work shall be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.

2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment period and sea turtle nesting and hatching periods.

3. Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss of special aquatic site habitat (coral reefs, wetlands etc.) and any ecological function unavoidably lost as a result of the project shall be replaced.

4. All project-related materials and equipment (dredges, barges, backhoes etc.) to be placed in the water shall be cleaned of pollutants prior to use.

5. No project-related materials (fill, revetment rock, pipe etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands etc.)

6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.

7. No contamination (trash or debris disposal, non-native species introductions attraction of non-native pests etc.) of adjacent marine/aquatic environments (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests etc.) shall result from project-related activities. This shall be accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan (HACCP - see http://www.haccp-nrm.org/Wizard/default.asp) to prevent attraction and introduction of non-native species.

8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.

9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.

10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding etc.).

TEMPORARY NATIVE IN-STREAM BAG BERM NOTES

1. The temporary bag berm shall be completely constructed and stabilized before the stream is diverted.

2. The stream should not be diverted until all necessary equipment and materials are on site so the work can proceed quickly and without delay.

3. Contractor shall perform inspection daily and before, during, and after the work day to ensure the structure is being maintained and not damaged. If the depth of sediment accumulation reaches one-third of berm height, Contractor shall remove and dispose of sediment in accordance with NPDES and 401 WQC Permit.

4. The bags should be removed by hand to prevent breakage and further disturbance of the streambed.

5. Because the potential for washout is high, the berm shall be carefully monitored and not be left unattended for any 24 hour period. Weather reports must be followed. If a storm event is expected, the site must be stabilized in preparation for it.

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Kent R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

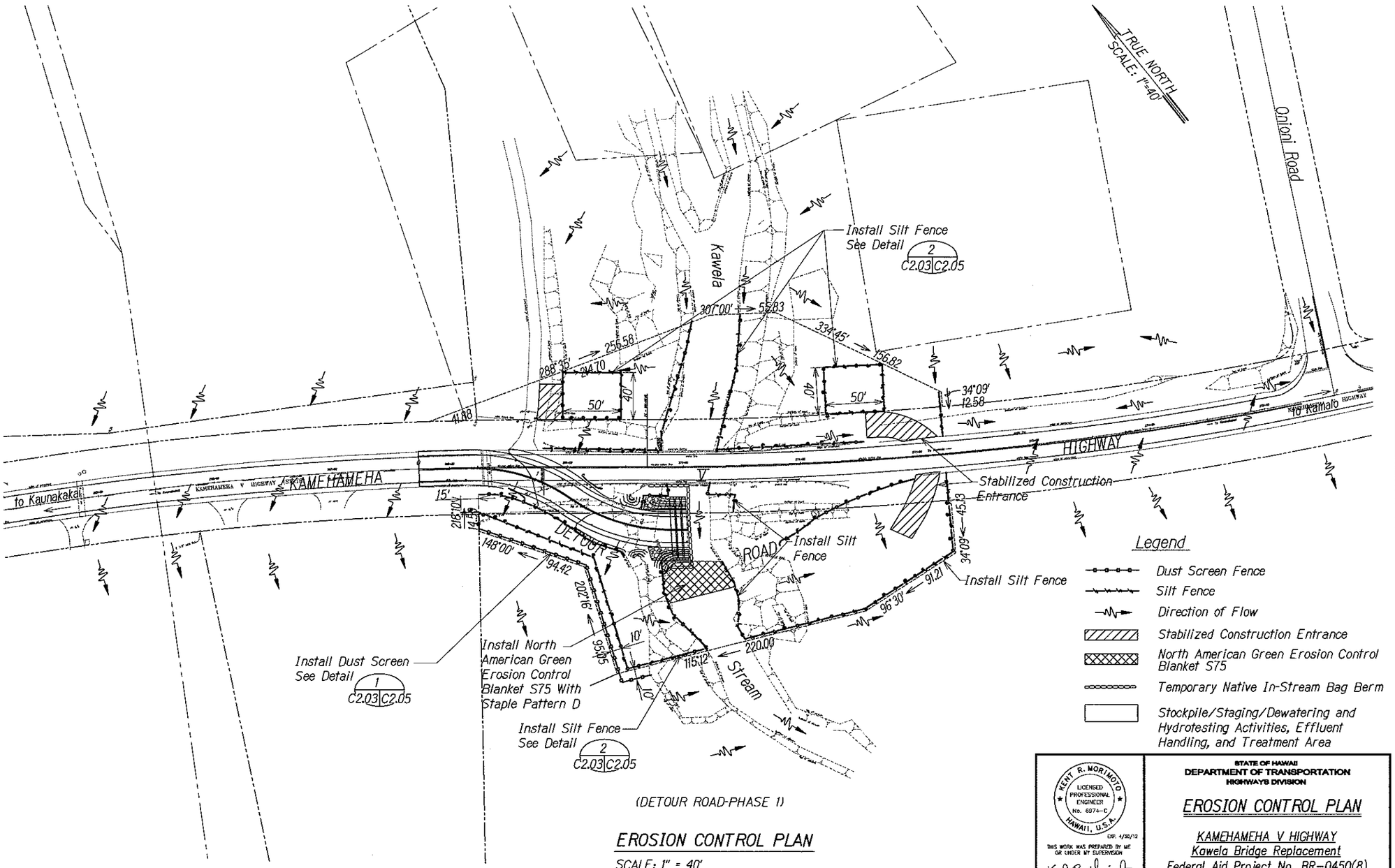
EROSION CONTROL NOTES

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C1.08 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	17	93



(DETOUR ROAD-PHASE 1)

EROSION CONTROL PLAN

SCALE: 1" = 40'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Kent R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

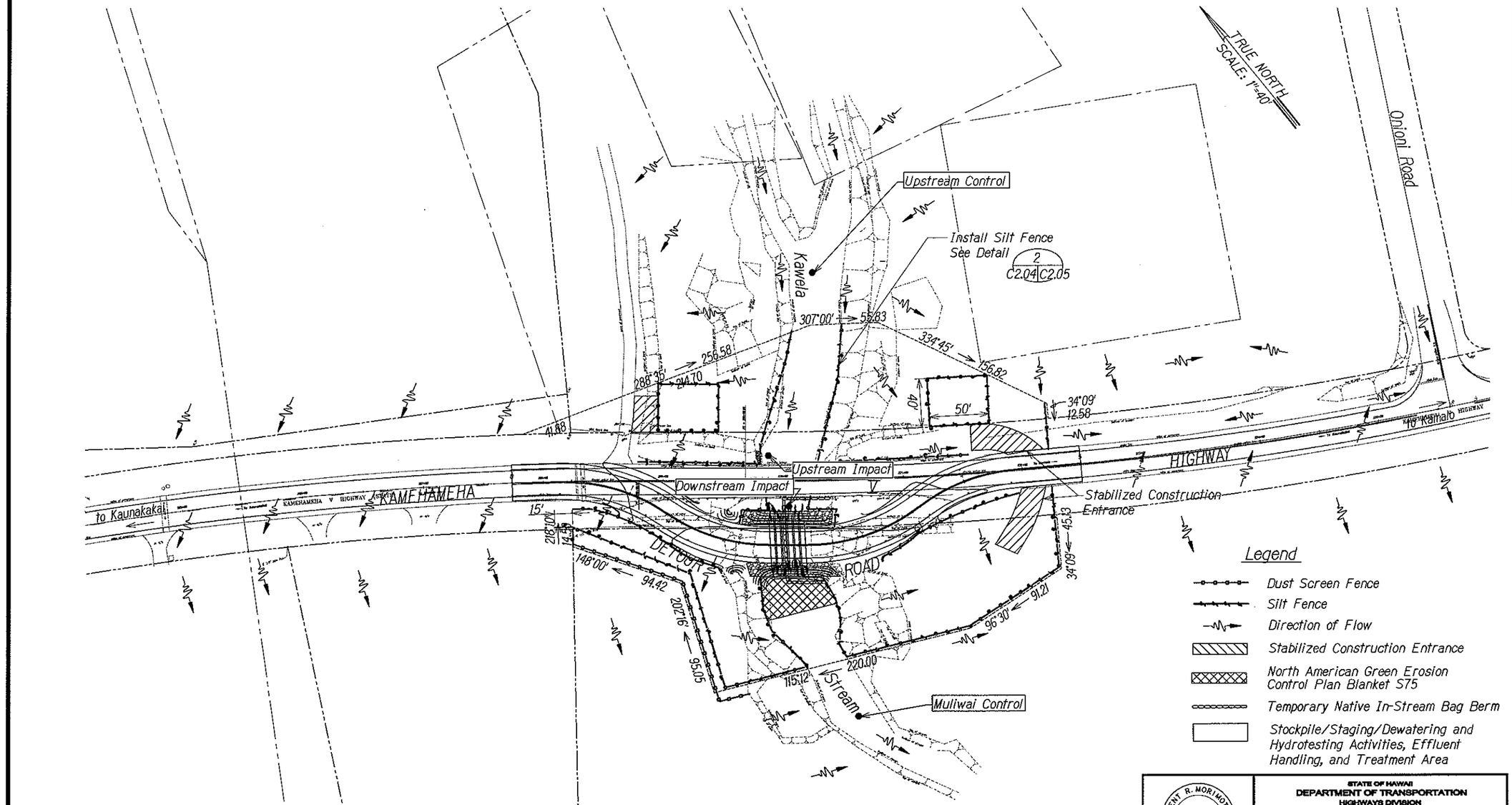
EROSION CONTROL PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C2.03 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	18	93



Legend

- Dust Screen Fence
- Silt Fence
- Direction of Flow
- Stabilized Construction Entrance
- North American Green Erosion Control Plan Blanket S75
- Temporary Native In-Stream Bag Berm
- Stockpile/Staging/Dewatering and Hydrotesting Activities, Effluent Handling, and Treatment Area

(DETOUR ROAD-PHASE 2)

EROSION CONTROL PLAN

SCALE: 1" = 40'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6874-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Ken R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

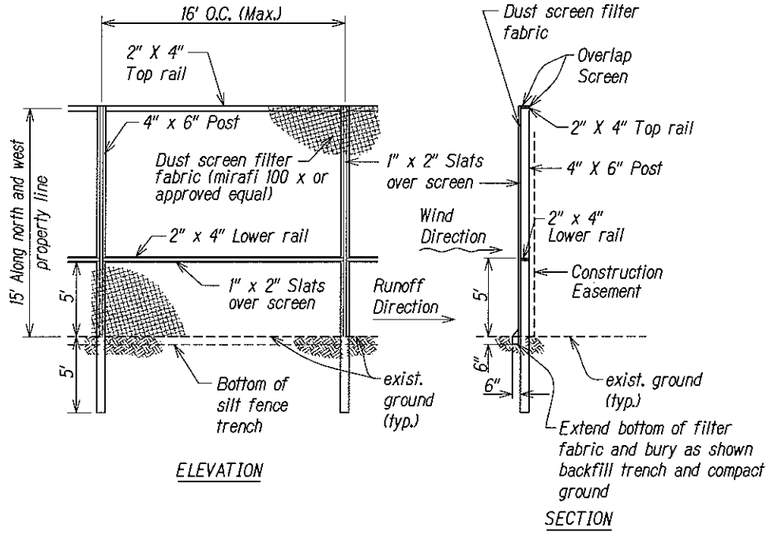
EROSION CONTROL PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

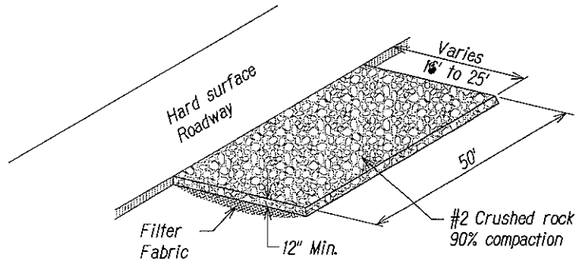
Scale: AS NOTED **Date:** June, 2010

SHEET No. C2.04 OF 93 SHEETS

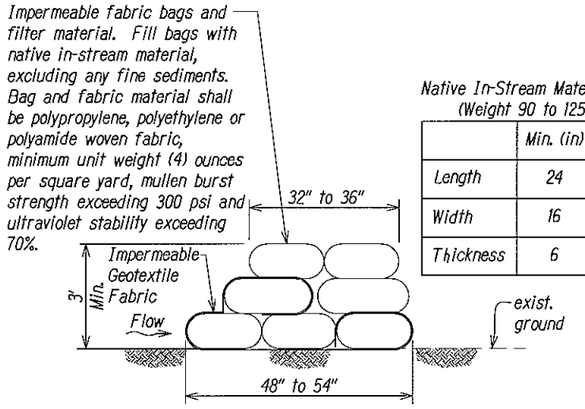
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	19	93



DUST SCREEN (1) C2.03 | C2.05
NOT TO SCALE



STABILIZED CONSTRUCTION ENTRANCE DETAIL (3) C3.01 | C2.05
NOT TO SCALE



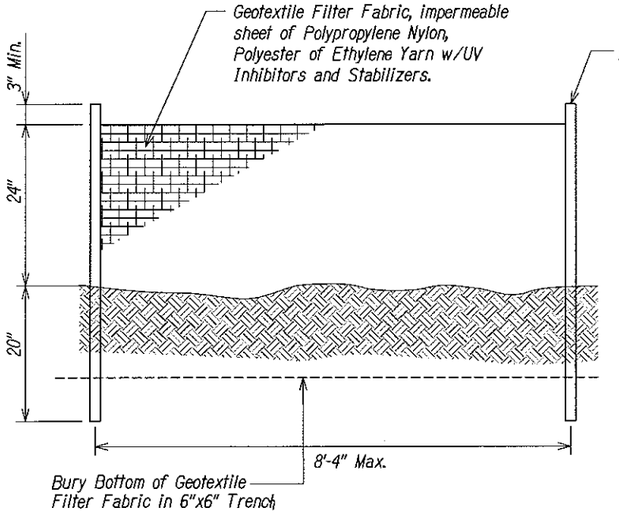
Native In-Stream Material Bag Size
(Weight 90 to 125 pounds)

	Min. (in)	Max. (in)
Length	24	30
Width	16	18
Thickness	6	8

NOTES:

1. The bags shall be a minimum of 3 bags high.
2. The end of the bags shall be turned up slope.
3. The bag rows and layers shall be staggered to eliminate gaps.

TEMPORARY NATIVE IN-STREAM BAG BERM DETAIL (4) C2.01 | C2.05
C2.02 thru C2.04, C2.06 thru C2.09

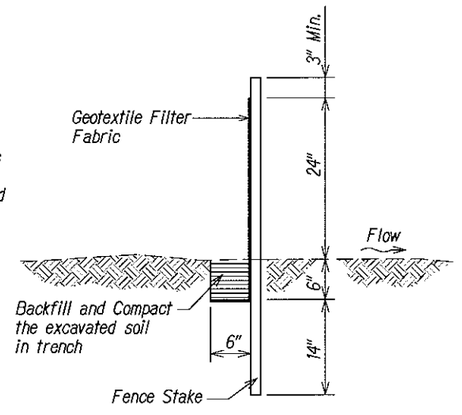


ELEVATION

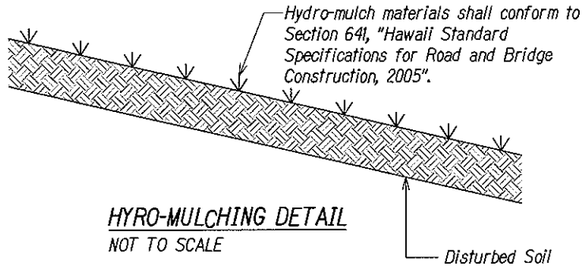
Notes:

1. The filter fabric shall be a minimum of 36 inches wide.
2. If silt fence is obtained from manufacturer as a package (I.E. fabric attached to post) the manufacturer's installation instruction shall be adhered to.
3. Fence stakes may be wood or metal, must be capable of supporting accumulated sediment

SILT FENCE DETAIL (2) C2.01 | C2.05
NOT TO SCALE C2.03



SECTION



HYDRO-MULCHING DETAIL
NOT TO SCALE

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6674-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EROSION CONTROL DETAILS

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

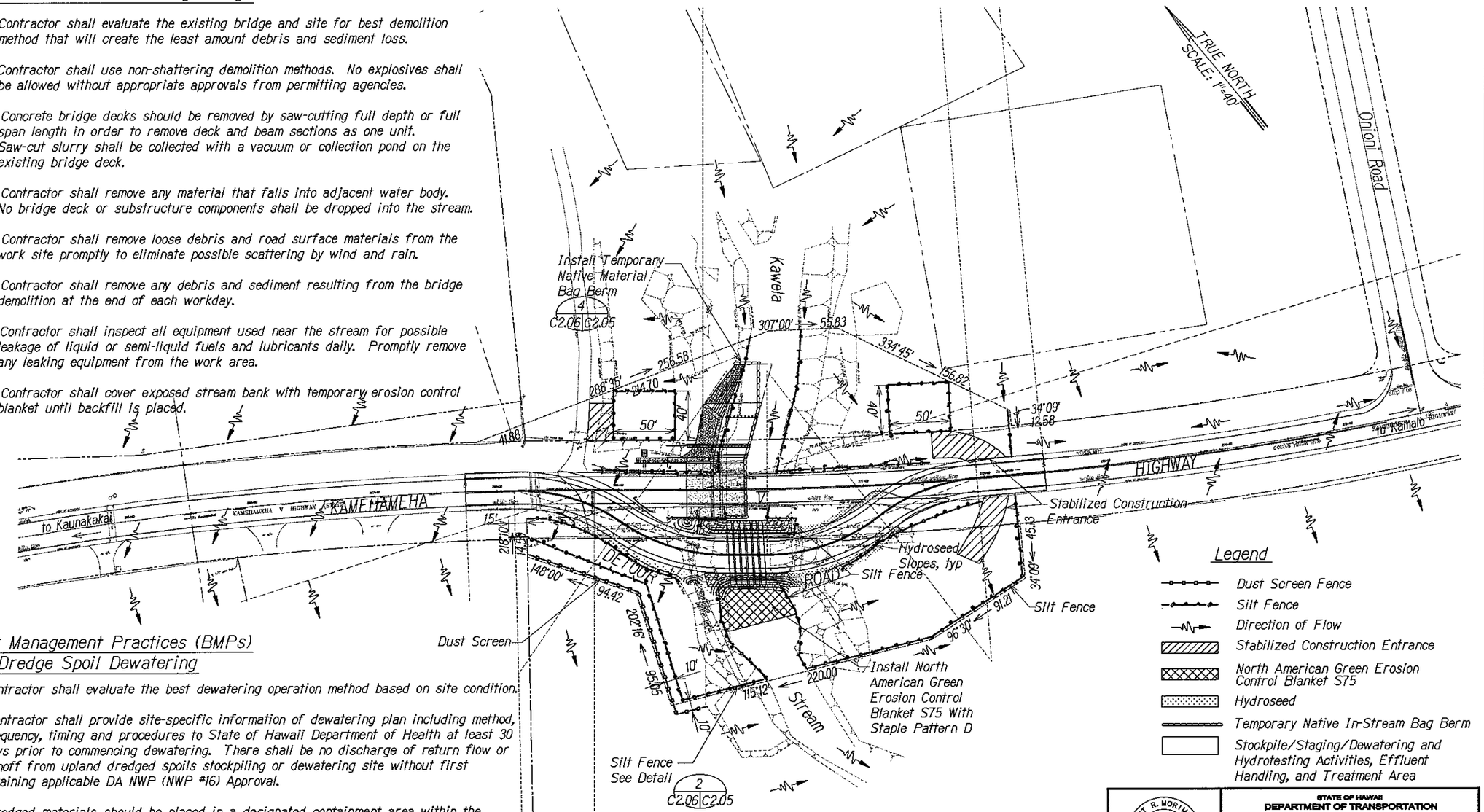
Scale: AS NOTED Date: June, 2010

SHEET No. C2.05 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	20	93

Best Management Practices (BMPs) for Demolition of Existing Bridge

1. Contractor shall evaluate the existing bridge and site for best demolition method that will create the least amount debris and sediment loss.
2. Contractor shall use non-shattering demolition methods. No explosives shall be allowed without appropriate approvals from permitting agencies.
3. Concrete bridge decks should be removed by saw-cutting full depth or full span length in order to remove deck and beam sections as one unit. Saw-cut slurry shall be collected with a vacuum or collection pond on the existing bridge deck.
4. Contractor shall remove any material that falls into adjacent water body. No bridge deck or substructure components shall be dropped into the stream.
5. Contractor shall remove loose debris and road surface materials from the work site promptly to eliminate possible scattering by wind and rain.
6. Contractor shall remove any debris and sediment resulting from the bridge demolition at the end of each workday.
7. Contractor shall inspect all equipment used near the stream for possible leakage of liquid or semi-liquid fuels and lubricants daily. Promptly remove any leaking equipment from the work area.
8. Contractor shall cover exposed stream bank with temporary erosion control blanket until backfill is placed.



Best Management Practices (BMPs) for Dredge Spoil Dewatering

1. Contractor shall evaluate the best dewatering operation method based on site condition.
2. Contractor shall provide site-specific information of dewatering plan including method, frequency, timing and procedures to State of Hawaii Department of Health at least 30 days prior to commencing dewatering. There shall be no discharge of return flow or runoff from upland dredged spoils stockpiling or dewatering site without first obtaining applicable DA NWP (NWP #16) Approval.
3. Dredged materials should be placed in a designated containment area within the construction staging area for dewatering which minimizes damage to natural resources of the area to be dredged.
4. Sediment control and other appropriate BMPs (e.g. sediment trap, etc.) should be employed when water is discharged. Dewatering discharges must not cause erosion at the discharge point.
5. No dredge spoil shall be placed back into the stream.

Legend

- Dust Screen Fence
- Silt Fence
- Direction of Flow
- Stabilized Construction Entrance
- North American Green Erosion Control Blanket S75
- Hydroseed
- Temporary Native In-Stream Bag Berm
- Stockpile/Staging/Dewatering and Hydrotesting Activities, Effluent Handling, and Treatment Area

(KAM. HWY. - PHASE 1)

EROSION CONTROL PLAN

SCALE: 1" = 40'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

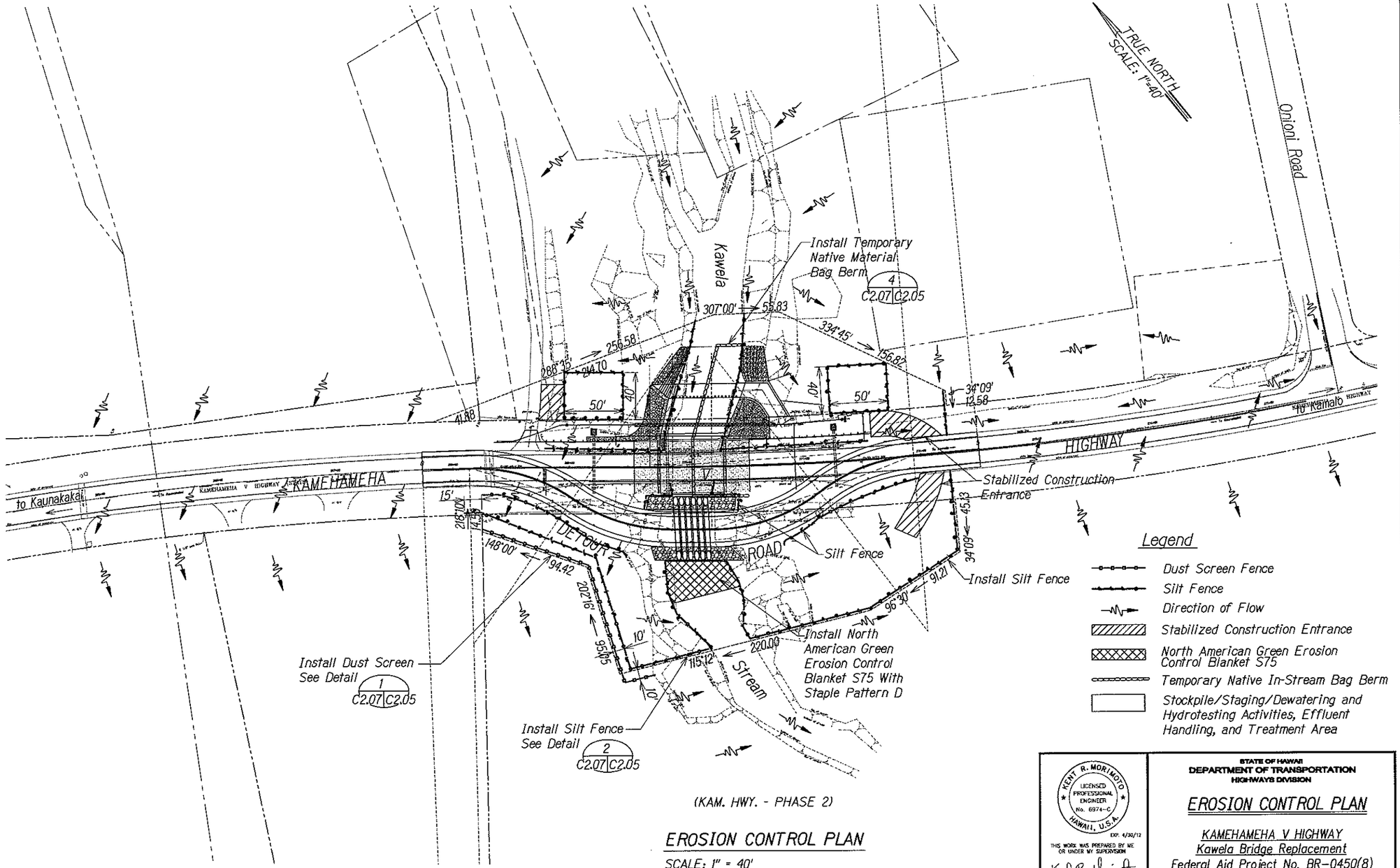
EROSION CONTROL PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C2.06 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	21	93



(KAM. HWY. - PHASE 2)

EROSION CONTROL PLAN

SCALE: 1" = 40'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Kent R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

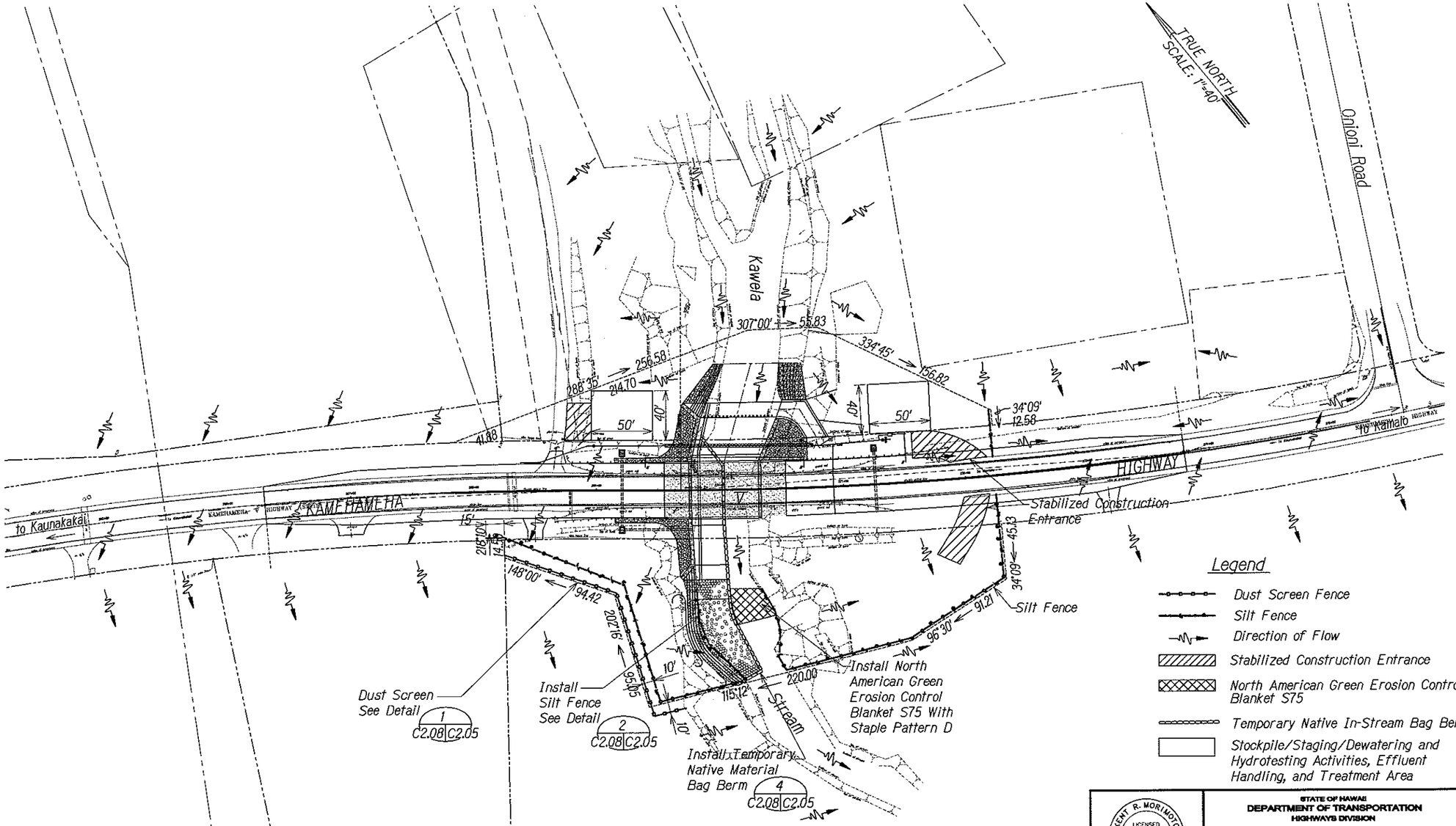
EROSION CONTROL PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C2.07 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	22	93



(KAM. HWY. - PHASE 3)

EROSION CONTROL PLAN

SCALE: 1" = 40'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

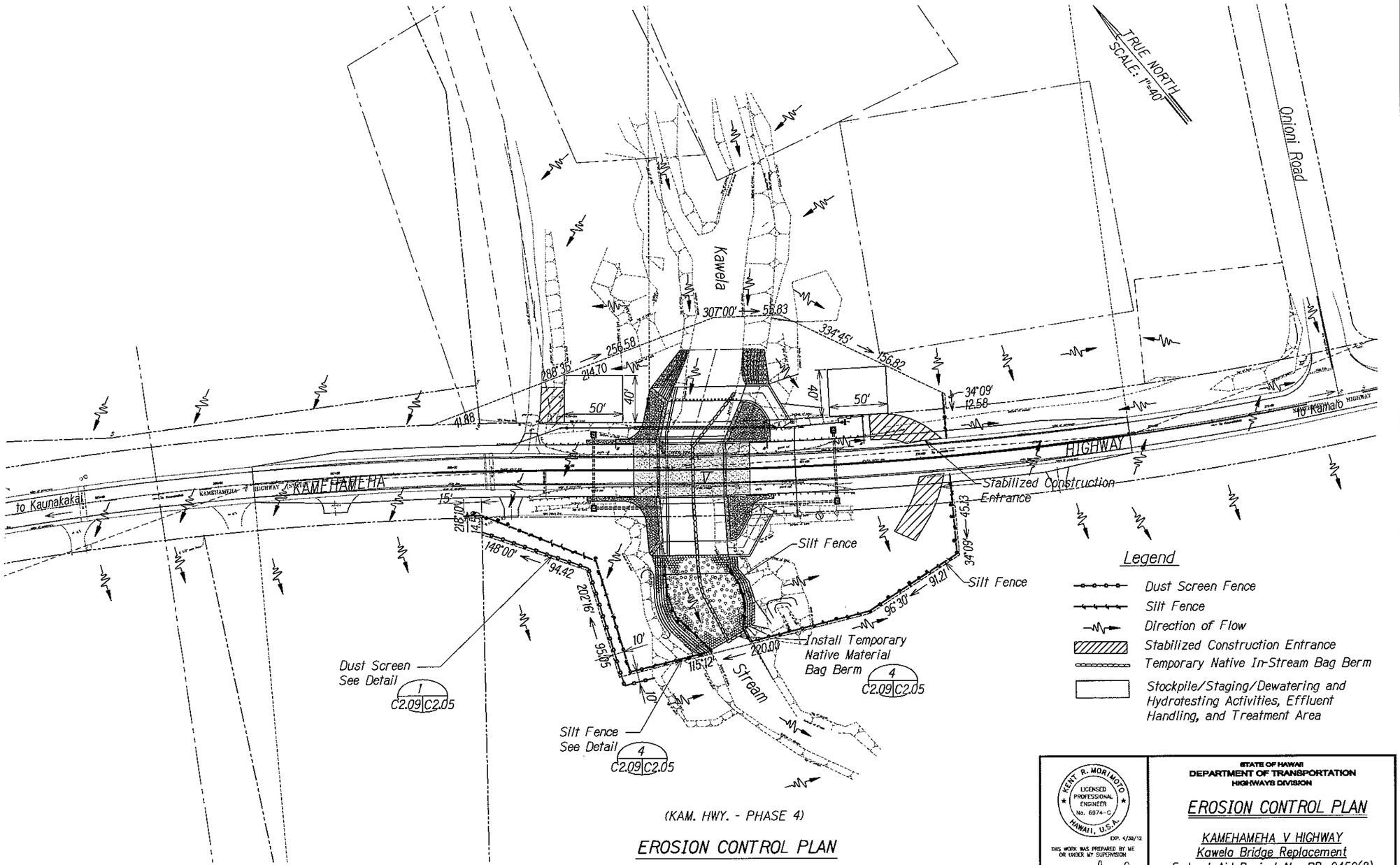
EROSION CONTROL PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C2.08 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	23	93



(KAM. HWY. - PHASE 4)

EROSION CONTROL PLAN

SCALE: 1" = 40'

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6874-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Kent R. Morimoto

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

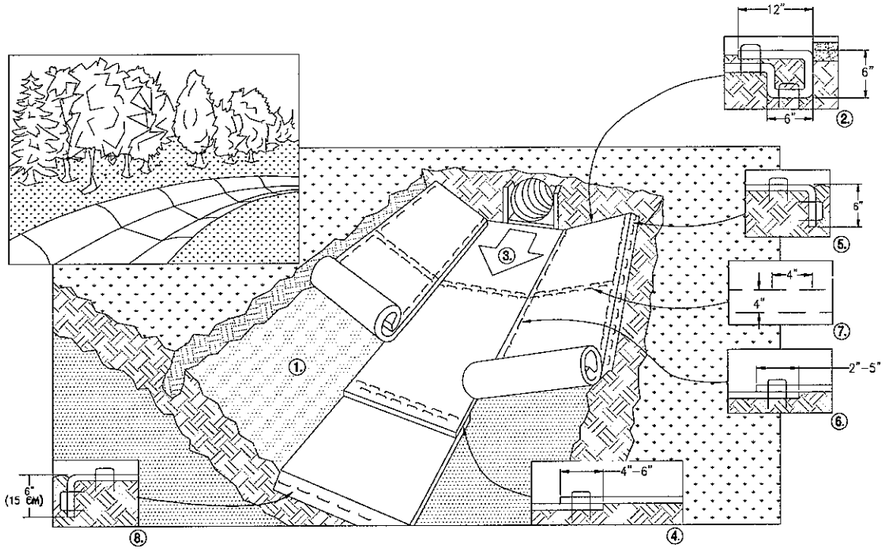
EROSION CONTROL PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

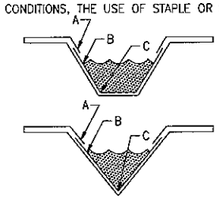
SHEET No. C2.09 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	24	93



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMAPCT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) ACROSS THE WIDTH OF THE BLANKET.
3. ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE BLANKETS END OVER END (SHINGLE STYLE) WITH A 4" – 6" (10 CM –15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER TO SECURE BLANKETS.
5. FULL LENGTH EDGE OF BLANKETS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT BLANKETS MUST BE OVERLAPPED APPROXIMATELY 2" – 5" (5 CM –12.5 CM) (DEPENDING ON BLANKET TYPE) AND STAPLED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 M – 12 M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

NOTE:
* IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE BLANKETS.



CRITICAL POINTS

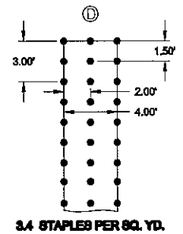
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTE:
* HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.

** IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 cm) MAY BE NECESSARY TO PROPERLY ANCHOR THE BLANKETS.

EROSION CONTROL BLANKET INSTALLATION FOR CHANNELS

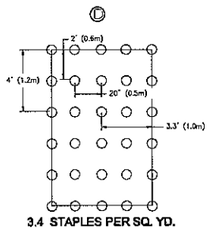
NOT TO SCALE



3.4 STAPLES PER SQ. YD.

STAPLE PATTERN GUIDE-4' WIDE ROLLS

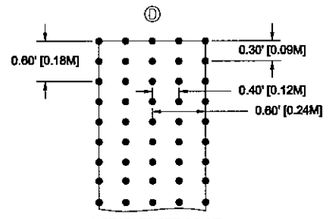
NOT TO SCALE



3.4 STAPLES PER SQ. YD.

STAPLE PATTERN GUIDE-6.67' WIDE ROLLS

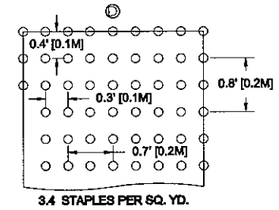
NOT TO SCALE



3.4 STAPLES PER SQ. YD.

STAPLE PATTERN GUIDE-8' WIDE ROLLS

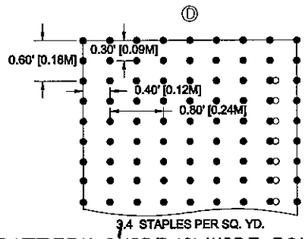
NOT TO SCALE



3.4 STAPLES PER SQ. YD.

STAPLE PATTERN GUIDE-13.3' WIDE ROLLS

NOT TO SCALE



3.4 STAPLES PER SQ. YD.

STAPLE PATTERN GUIDE-16' WIDE ROLLS

NOT TO SCALE

NORTH AMERICAN GREEN
1448 HIGHWAY 41 NORTH
EVANSVILLE, IN 47725
800-772-2040
www.nagreen.com

KENT R. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6974-C
HAWAII, U.S.A.
EXP. 4/30/12

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EROSION CONTROL BLANKET DETAILS

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: June, 2010

SHEET No. C2.10 OF 93 SHEETS